RUBBER and PLASTICS WEEKLY

VOLUME 141 NO. 11 SEPTEMBER 9 1961 ONE SHILLING

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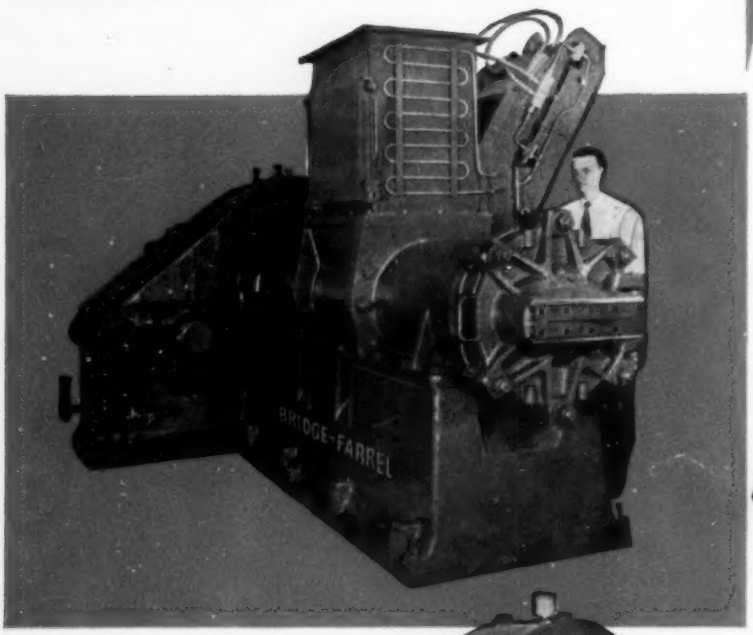

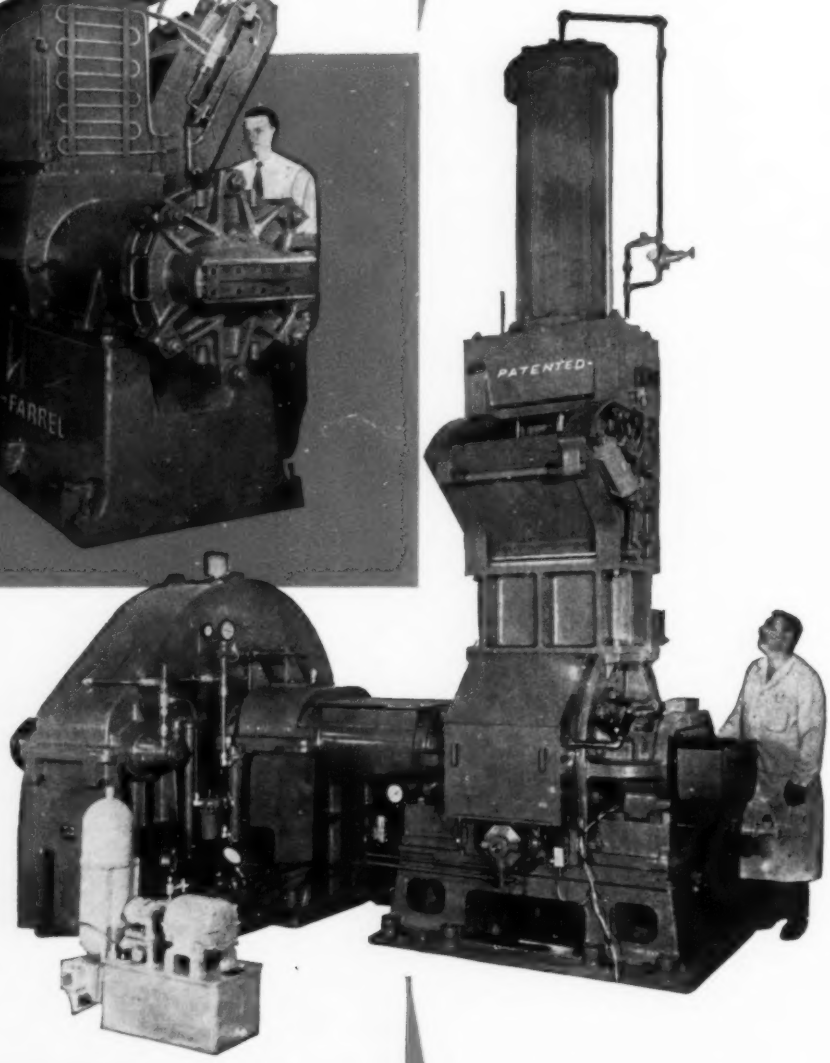

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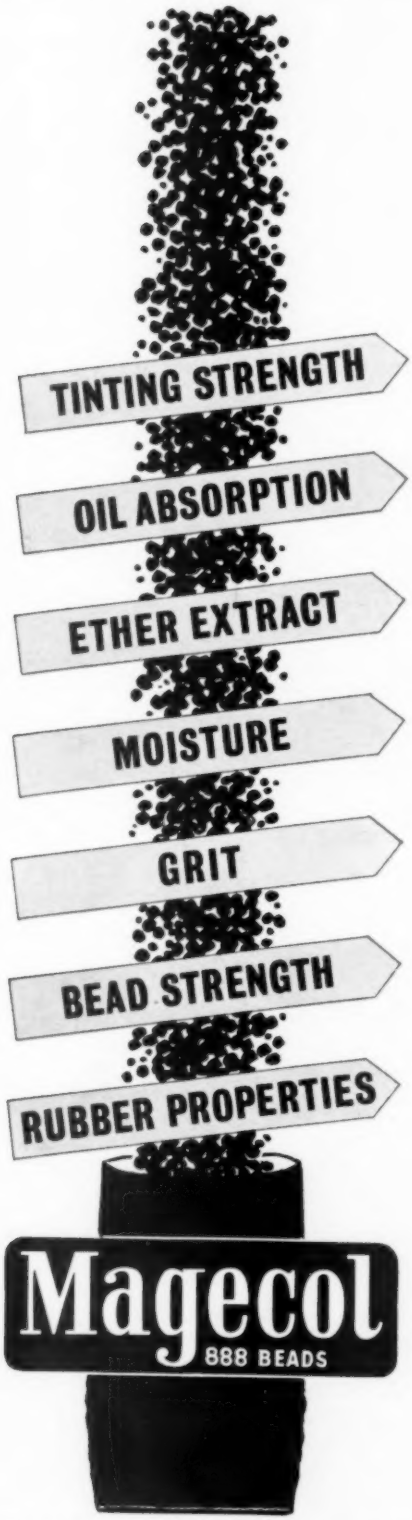

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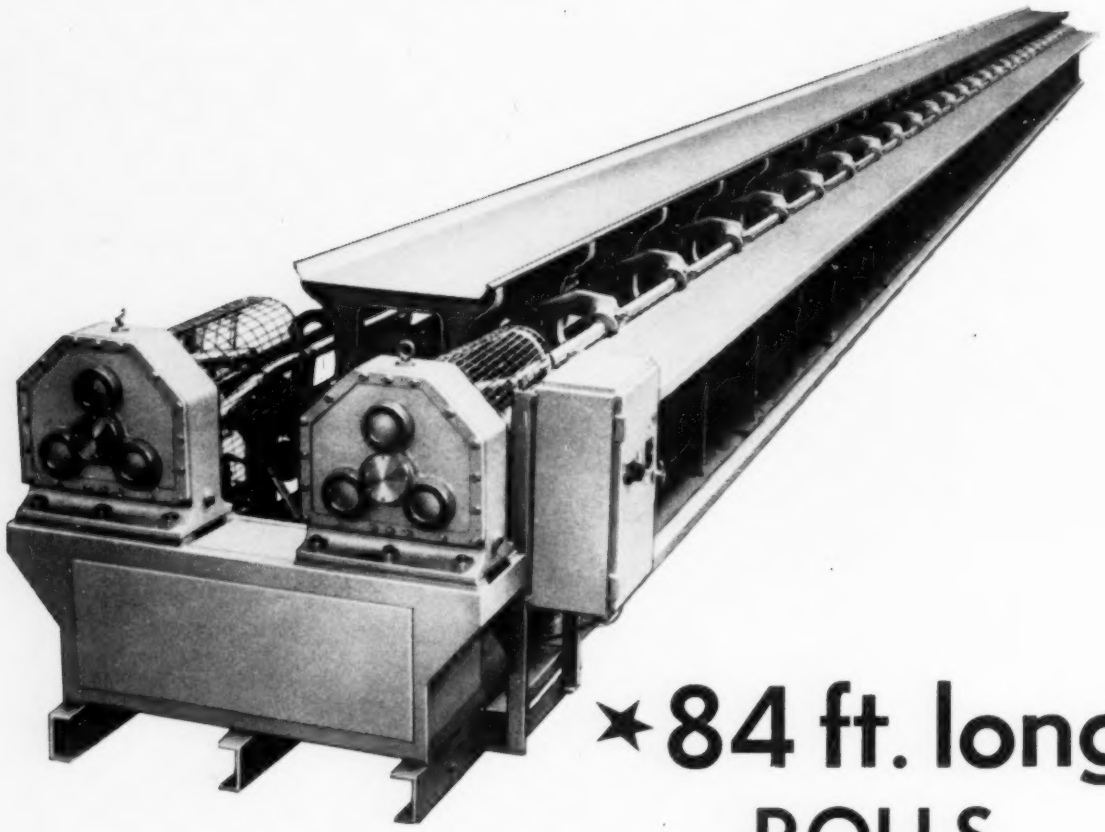

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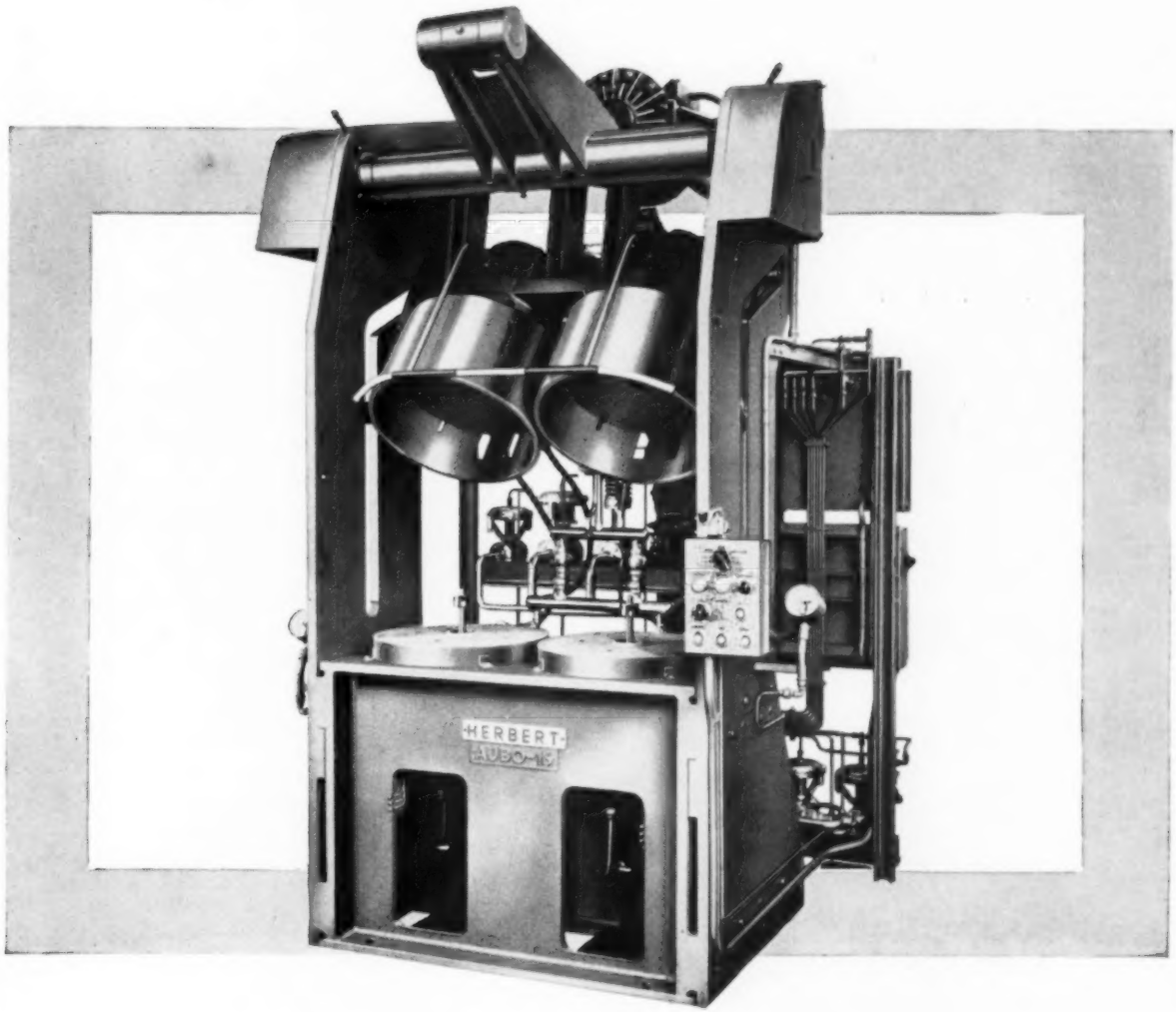

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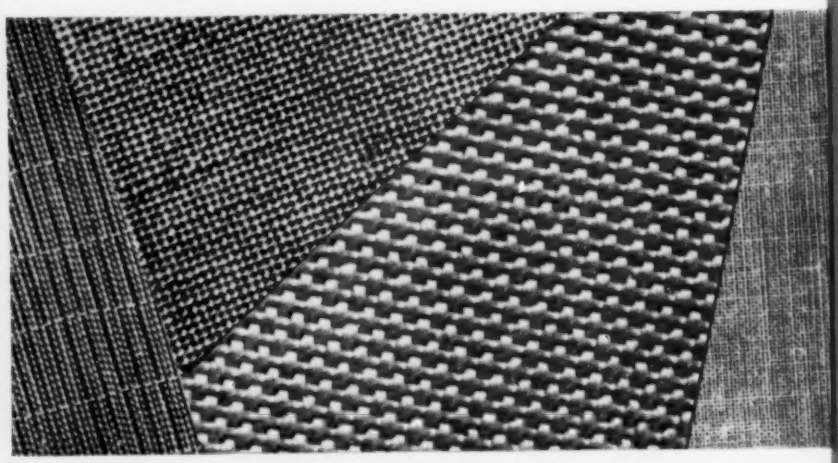

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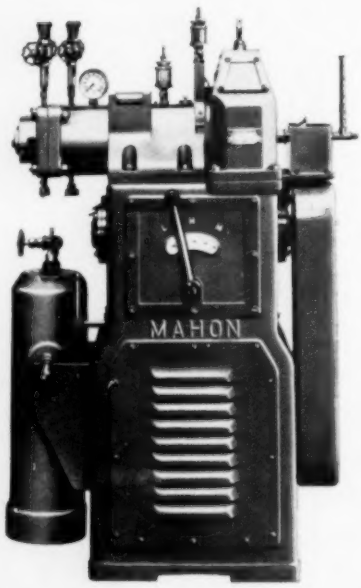

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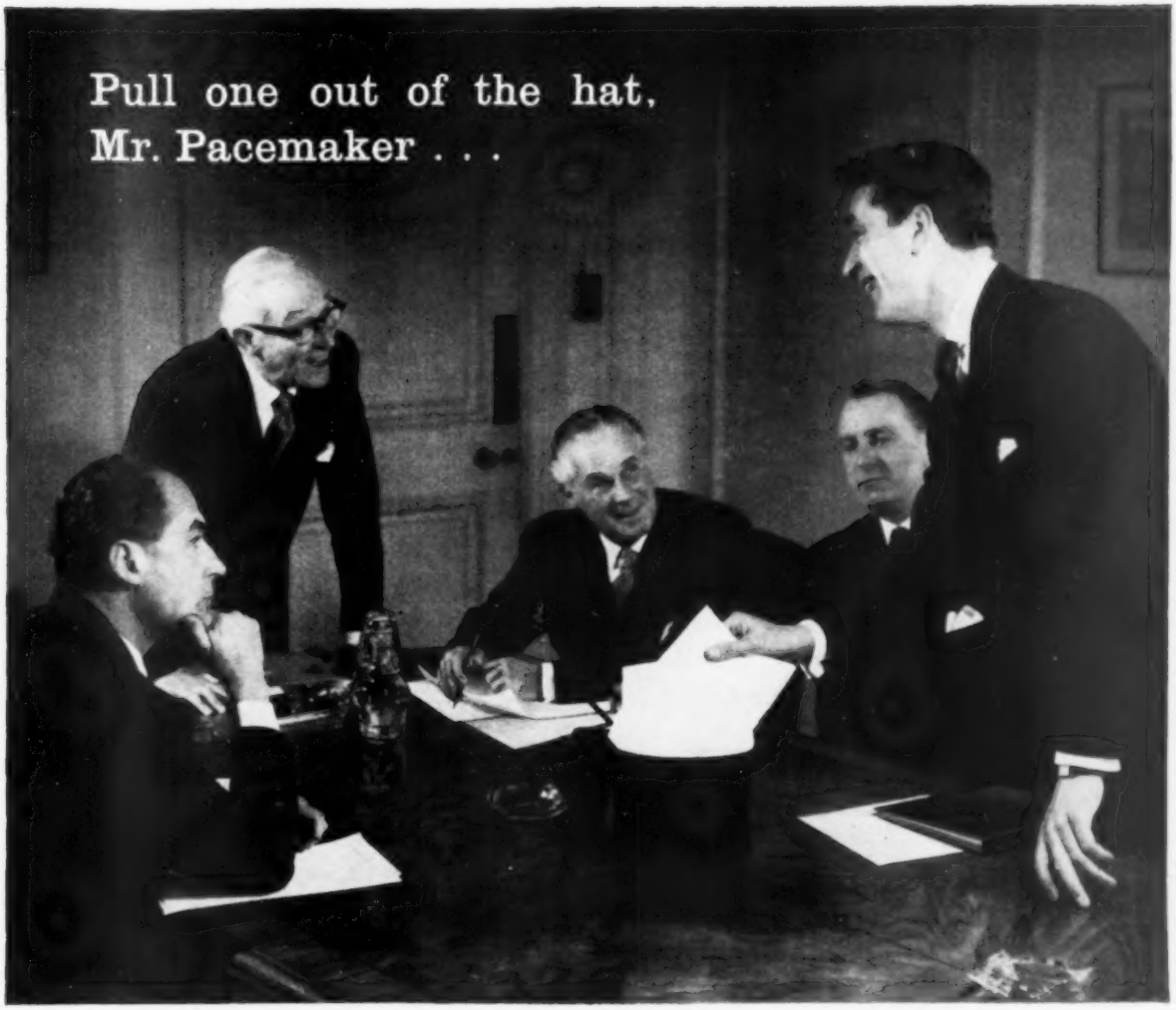

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RUBBER and PLASTICS WEEKLY

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Volume 141 IN ITS 78th YEAR No. 11

September 9 1961

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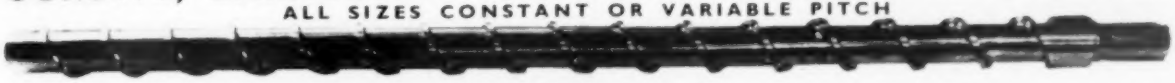

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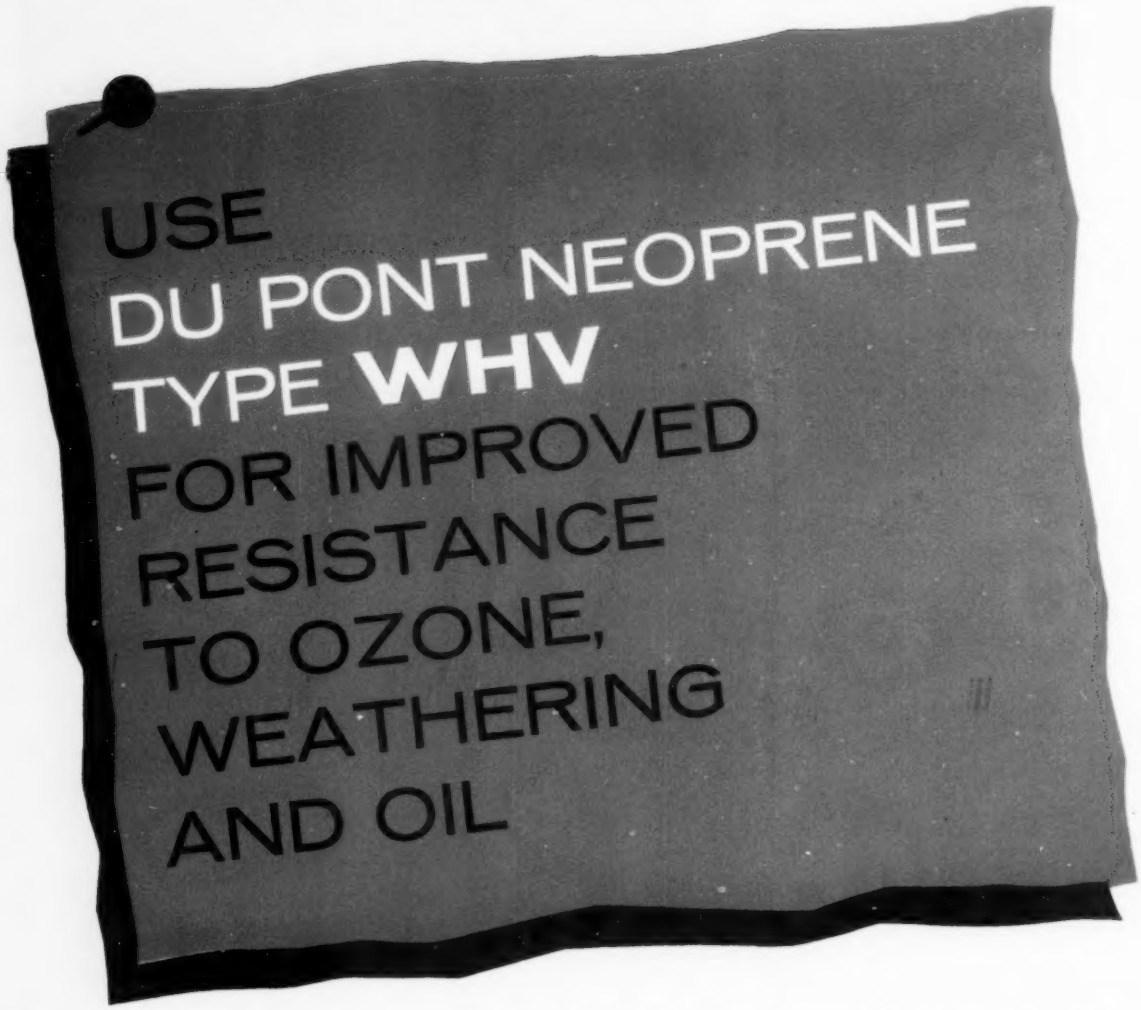

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'RUBBER & PLASTICS WKLY 9/61

NOTES of the WEEK

Manchester and Milan

THE negotiations for the terms of admission of the UK to the Common Market under article 237 will be difficult and protracted. But if integration does take place—and the odds are clearly in this direction—then UK manufacturers will have to think in terms of a continent as a home market. A rubber firm in Manchester may find that for one particular line its closest rival is in Milan. Trends in continental industrial design will be picked up more quickly in the UK, and vice versa. In this 'negotiating period', therefore, manufacturers should keep an eye on their opposite numbers within the Common Market.

The Italian rubber industry, for example, is in a healthy state. The 1960 level of production was 33% up on the previous year, and current sales figures suggest that up to 19% of this production is being exported. There are about 100 large and medium-size rubber firms in Italy, employing 30,000 workers. About 70% of these workers are with four firms: Pirelli, CEAT, Michelin Italiana and Società Italiana Gomma and Hutchinson. Some of the strength of the industry is shown by one of its growth sections: rubber footwear. As in other countries, a marriage has taken place between the traditional skills of the Italian footwear craftsmen and the technological and mass-production techniques of the rubber industry.

A measure of the success of this marriage is the fact that low-cost footwear from the Far East has made hardly any impression on the Italian market.

The international number of *RPW*—which will be published on October 21—will contain an article on the effects which the UK joining the Common Market will have on UK producers of rubber and plastics raw materials and finished products. Written exclusively for this journal by the Economist Intelligence Unit, the article will help the manufacturer to adjust his commercial sights for the integrated Europe of the future.

Integration Slow-down

INTEGRATION was one of the themes at the annual meeting of the British Association for the Advancement of Science, which came to a close on Wednesday (September 6). Sir Wilfrid Le Gros Clark, in his presidential address, developed the idea that 'consciously directed co-operativeness has been the major factor which determined the evolutionary origin of *Homo sapiens* as a newly emergent species and the gradual development of the peculiarly human form of integrated society. . . .' He held that now, however, the process of integration has tended to slow up and ultimately threatens to come to a full stop. One of the bright spots that Sir Wilfrid believes is keeping the impulse towards co-operation alive is science and technology. People may be divided by political and other interests, but scientists speak with a common idiom and use a common terminology. Sir Wilfrid thus arrived at praise of the multiplicity of scientific congresses, conferences and symposia that has been receiving a good deal of criticism lately.

The criticism has, of course, been made in a different context. Most people would agree with Sir Wilfrid that from the point of view of international relations, international conferences and exhibitions are a good thing. But the industrialist must look at them in a different light: what is there to be gained by attending them, in the short term, and in the long term? Criticism of conferences has been that their objects are often not well defined, that they are uncoordinated and that this leads to a great deal of duplication. The suggestion has been made that an official body should act as a clearing house for the co-ordination of, and perhaps later the control of, conferences. This is obviously a step of the first importance. It could be taken at such a 'conference on conferences', as Charles Jennings suggested in this journal recently (July 22, 130). But meanwhile there is something that each individual company could do.

Reporting Back

IT is ironic that in our industry, with its scientific basis, the reports to his company of a person attending a conference are frequently anything but scientific. They are often regarded as a necessary chore, both by writer and reader—at the lowest level they are treated simply as 'evidence of having been there'. Picking out salient points at a conference, organizing them and passing information gleaned to other people in the company, who can make the best use of them, is a difficult job. But if every person who attended a conference made a genuine attempt at assessing its value for his firm—and if every firm insisted on this—then there would soon be a feed-back of information to the organizers of conferences. Certainly the organizers would appreciate this form of instructive criticism and suggestion—and they would certainly gain a more concrete idea of the needs of the people for whom they are organizing.

NEWS *Briefs*

US POLYSTYRENE PRICE UP — BTR SET UP IN GERMANY—PVC FACTORY FOR SPAIN—MALAYAN DROUGHT EFFECTS — US RUBBER STRIKE ENDS

●**Singapore** — The Far Eastern Conference has confirmed its decision to increase freight charges by 10% with effect from September 1. When the new rates were first announced earlier this month various quarters in Hong Kong protested. The increase applies to all member lines of the Far Eastern Freight Conference, the Japan Outward Freight Conference and the Philippines-Europe Conference. It was also announced that freight rates from Singapore to West African ports will rise by 10% on November 1.

●**United States** — The 1,300 striking workers at the United States Rubber Company plant at Passaic, New Jersey, voted by a two-thirds majority to go back to work. The workers had been on strike since August 15 over a company proposal that former piece-work employees should be paid 90% of what they earned before they were transferred to other work. The company finally agreed to pay 92%.

●**Spain** — Continental Gummi-Werke AG has recently increased its holding in its Spanish subsidiary Industrias Rio Del Coucho SA from 25 to 50% by the purchase of 1,150,000 pesetos worth of shares from Spanish holders. The German tyre firm said that revaluation of the market last March had caused a drop in exports and it was doubtful if exports could be maintained at last year's level of 15.4% of the total turnover. But domestic demand was good and total turnover for the current year was to be higher than in 1960.

●**West Germany** — To speed-up delivery times and to provide an on-the-spot service for customers in Germany, BTR Industries Ltd., in anticipation of Britain's entry into the Common Market, has formed a wholly-owned subsidiary in Cologne — BTR Industries GmbH. This new company will initially manufacture Hi-Flex hydraulic hose assemblies to meet British, American, German and French standards and sizes.

●**Singapore** — Drought conditions being experienced at the moment, while not affecting the northern half of Malaya, will probably have an adverse influence on production in the more southerly parts, according to a circular issued by a firm of brokers. While not immediately noticeable, dry conditions cause lower production which continues for two or three weeks after the drought is broken. Thus there should be little alteration to the August output, any effect being felt in September. A more depressing factor is the high mortality rate among young trees in newly-planted areas caused by hot and dry conditions.

●**United States** — A proposed merger of Cities Service Co. and Columbian Carbon Co., through a pooling of interests was approved recently by the boards of directors of both companies. A joint statement issued by the two companies, states that the merger plan will represent an important step forward in the diversification programmes of each company. Each company will continue to carry on its principal activities with present management and personnel.

●**Spain** — Solvay and Cie. has asked for authorization to install a factory for the production of polyvinyl sheeting for roofing and walls at Torrelavega, Santander. Machinery worth 15,600,000 pesetas will be imported from France, Italy, Belgium and Western Germany.

●**Nigeria** — Dunlop Nigeria Industries, the tyre manufacturing concern being set up by Dunlop, will have an authorized capital of £2.5m., of which £1.5m. will be issued. The Dunlop Rubber Co. will hold 51% of that amount and the remainder will be distributed throughout the country.

●**Singapore** — A further $M12m. is to be invested in Singapore by Shell. A $M6m. plant for the production of lubricating oils is being erected by Shell Lubricants Blending Co. (Singapore) which is expected to produce 7m. gallons yearly and will be in operation in 1964. 75,000 tons of bitumen will be produced annually in a $M4½m. plant which will come on stream next year. Liquid petroleum gas will be produced at the Pulau Bukom refinery and will require $M1½m. of additional equipment.

●**United States** — The Rexall Chemical Co. has raised the price of polystyrene by one cent per lb. with effect from September 15. A spokesman for the company said the increase was necessary for the health of the industry and that at the present price nobody was making any profits. Other makers of polystyrene are said to be studying the Rexall move, and there is as yet no indication of a general increase.

DIXIE 45 is a general purpose, low cost furnace black now manufactured in the U.K. Possessing an unusual combination of the high modulus of HMF blacks; the high resilience, low hysteresis and low heat build up of SRF blacks; the smooth extrusion characteristics and low die swell of oil based blacks.

DIXIE 60 (HAF Black) processes easily and gives high resistance to abrasion and flex-cracking. Dixie 60 is now manufactured in the U.K. to the same high standard of uniformity and quality maintained by its American counterpart over many year.

DIXIE 70 (ISAF Black) is the latest addition to the range of Dixie Blacks now being manufactured in the U.K. Ideal for toughest treads, maximum mileage tyres and for gruelling high speed highway operations.

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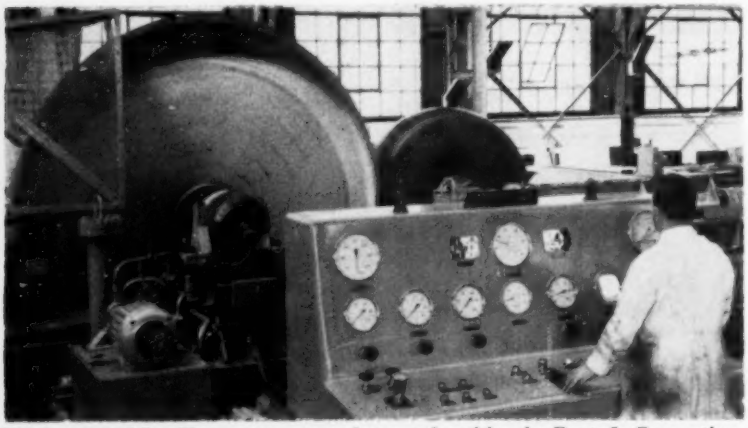
London Office: Grand Buildings, Trafalgar Square, W.C.2.
Scottish Agents: J. & G. Hardie & Co. Ltd., 178 Fulton Street, Glasgow, W.3
American Liaison and Service Branch: British Anchor Chemical Corporation, 366 Madison Avenue, New York 17, N.Y.

Tyre Test Plant for Roumania

SPECIAL MACHINES ORDERED BY RUSTYFA CONSORTIUM

ECCENTRIC steel drums of unusual design are incorporated in three of five tyre test plants recently built by Heenan and Froude Ltd. of Worcester, for export to a Roumanian factory.

The drums were specially designed to impose severe stresses on the walls of giant, large giant, and earthmoving tyres, two of which may be tested simultaneously on each of the machines. The tyres, one to each side of the drum, are applied by powerful hydraulic rams. As the drum revolves, its unusual contour forces the tread of the tyres from side to side, thus subjecting the walls of the tyres to considerable strain.



The largest of five Heenan tyre test plants ordered by the Rustyfa Consortium for a Roumanian tyre factory, undergoing trials at Worcester. The machine shown is fitted with one of the three special eccentric drums, designed to impose stresses on the tyre walls

The five Heenan machines, ordered by the Rustyfa Consortium as part of the equipment for a Roumanian factory, consist of one 15,000kg., two 5,000kg., and two 2,000kg. machines, these being designated by the maximum load which can be applied to each of the tyres under test. Each of the three larger models is supplied with two drums, one eccentric and one conventional.

The 15,000kg. machine, which has a total weight of about 60 tons, is designed for routine test duties at speeds ranging between 8-56kmph. The 5,000kg. machines weigh about 15 tons apiece. One of these is for routine testing at speeds ranging from 24-72kmph, the other, intended for development purposes, will test at between 8-128kmph. The two smallest machines are each approximately 12 tons in weight. Again, one is intended for routine testing at speeds between 8-80kmph, the other for development duties at 8-128kmph.

More Bakelite Price Cuts

Following the recent reduction in the price of most Warerite designs (*RPW* September 2, 349) Bakelite Ltd. has now made substantial price cuts in a large range of plain colours.

Seventeen plain colour veneers with satin finish have been reduced from 4s. 2d. per sq. ft. to 3s. 5d. and plain white is now down to 3s. 2d.

New Adhesive for Polystyrene

To meet the special requirements for an adhesive to bond expanded polystyrene to wall and ceiling surfaces of plaster, cement, smooth concrete, hardboard, timber and flat asbestos sheeting, the Industrial Adhesives Division of Evode Ltd., has developed Evo-Stik Impact Adhesive SL 863.

The adhesive is easy to apply and provides an immediate bond on contact by hand pressure only, no other mechanical sustained pressure being necessary. The initial tack of the adhesive is sufficient to hold the foam firmly in position but slight adjustments can be made in the positioning of the panels while the adhesive is still wet.

Teflon Price Cut by Du Pont

The price of Teflon 7 fluorocarbon resin has been reduced by 4s. a lb., with effect from September 5.

The new price of resin packed in 10lb. drums is 34s. 9d. per lb. and in 35lb. drums 30s. 6d. This brings the price into line with Du Pont's other granular resins, Teflon 1, 1B and 5, the prices of which remain unchanged. The reduction reflects recent manufacturing improvements and increased production capacity.

Acheson Taken Over by Cabot

CABOT Carbon Ltd. of Stanlow, Ellesmere Port, and Acheson Industries (Europe) Ltd., of 1 Finsbury Square, London, have reached the conclusion of a purchase-sale agreement between the two companies and completion of the transactions during October 1961 has been tentatively agreed.

Under the terms of the agreement Cabot Carbon Ltd. will purchase the business and manufacturing facilities of the Acheson Dispersed Pigments Division of Acheson Industries (Europe) Ltd. situate at Dukinfield, Cheshire. This transaction is allied to a larger purchase and sale agreement under the terms of which Cabot Corporation of Boston, Mass., is to acquire the business and manufacturing facilities of the Acheson Dispersed Pigments Co. of Philadelphia, Pennsylvania, and its subsidiaries and affiliates in Orange, Texas and Xenia, Ohio.

Acheson Industries (Europe) Ltd. will retain the facilities and continue to operate its colloids subsidiaries and divisions at Plymouth, England, and Scheemda (Gr.), The Netherlands.

Cabot Carbon Ltd. will operate the Dukinfield plant during the immediate future as the Acheson Dispersed Pigments Division of Cabot Carbon Ltd.

The Cabot organization is one of the world's largest producers and distributors of carbon black and as such its knowledge of pigments will contribute importantly to strengthening Acheson Dispersed Pigments' position in the carbon black-thermoplastic resin dispersion field.

In addition, this acquisition will enable Cabot to pursue the commercial development of its cross-linkable polythene compounds which are marketed under the name Cab-XL.

Rigidex HD Polythene Price Cut

Distillers Plastics Group has announced reductions in the prices of Rigidex high density polythene of up to 4d. per lb. according to grade. Filament grades are down by 1½d. per lb., bottle grades by 3d. per lb. and injection moulding grades by 4d. per lb.

PLASTICIZERS FOR PVC — PART 1

History and Theory of Plasticizers

SITUATION BECOMING INCREASINGLY COMPLEX

By W. S. PENN, BSc

This is the first of a series of articles on plasticizers for pvc by W. S. Penn, whose articles on stabilizers appeared in recent issues of *RPW*. As with the previous series, a classification of plasticizers will be made, with a description of the properties and application of each common material. A method of choosing a plasticizer aimed at reducing the amount of practical work necessary will be outlined and commercial plasticizers available will be reviewed

IT is now well known that cellulose nitrate was the first commercial plastics but it has perhaps been forgotten that it was responsible for starting the search for those materials which we now call plasticizers. When first prepared, cellulose nitrate was useless as a workable material until, by one of those fortunate technological chances, it was found that camphor transformed the product into a material which could be readily moulded and fabricated. Thus was the first material used as a plasticizer discovered.

Because of the inflammability of cellulose nitrate compounds, it was not long before alternatives were sought and the acetate produced. It was natural that an attempt should be made to use camphor as the plasticizer with the new plastics but unfortunately for the original manufacturers it was unsatisfactory. This was a most fortunate circumstance for the thermoplastic industry today since a search for other materials began and very soon it was found that many high boiling esters served very well as alternatives. Thus was the thriving plasticizer industry born.

Continuous Progress

When the vinyls came along it was natural to turn to those plasticizers which had proved successful for cellulose acetate and, in general, they proved to be quite compatible. Those days do not seem so long ago and it certainly is not very long since TCP (as it was then) and DOP reigned supreme. Fortunately, it must be admitted, industry did not stop there and each year examined many new materials. The need arose for plasticizers to operate successfully at high or low temperatures; to give better drape; to be non-toxic; to give good electrical properties and so on. Types for these characteristics and many others were invariably developed.

Today there are hundreds of chemicals used as plasticizers for pvc. It should be stressed, however, that not one is 'universal', in the sense that it will suit any purpose and that a plasticizer, or more likely plasticizers, must be chosen for a specific application. Perhaps a universal plasticizer will never be found, and on theoretical grounds it would seem impossible, but we should remind ourselves that the epoxy plasticizers have the efficiency of the monomeric types and the 'tenacity' of the polymeric types.

Apart from the need for improved technological properties, the cost factor has intensified during the past few years. The search for cheaper products, *with as good properties*, is being extended and the simple stage of replacing DOP with DIOP has long since been passed. The '79' plasticizers are now extensively used and this idea will undoubtedly spread.

Thus the plasticizer industry is now a large and diverse one and the technologist has a wide choice of products at his disposal. He must choose between them very carefully from the twin points of view of technical merits and cost.

Definition and Requirements

Plasticizers may be defined in two ways. First from their chemical composition and second from the function they perform.

Generally plasticizers are chemicals, usually liquid, with high boiling points and more specifically they are frequently high boiling esters. As far as a functional definition is concerned, they are materials which have the property of converting the hard, horny pvc resins into flexible and workable materials. They also modify or extend the basic properties of the resins or create new properties.

The plasticizers are required to have a wide and often opposed range of properties. These include compatability with the resins, non-volatility, high efficiency, non-inflammability, good heat and light stability, good low temperature properties, non-toxicity and the like. All of these properties cannot be obtained in any one plasticizer, hence the interminable search for new ones. Any choice of plasticizer, therefore, as with so many other products in technological work, must be a question of compromise.

Normally, to be a plasticizer, a material must be compatible with the resin. Since all materials vary in their compatibility it is convenient to divide them into primary and secondary plasticizers and perhaps extenders. The primary plasticizers are highly compatible with the resin, and as a guide, about 150phr should be freely compatible. They may readily be used as the sole plasticizer. The true secondary plasticizers have a limited compatibility with resins and are usually mixed with primary plasticizers to confer some special properties or reduce cost. The extenders form a branch of the latter group and have negligible compatibility but can be used in relatively small proportions with other plasticizers to reduce cost.

Chemical Composition

The primary plasticizers are, among other materials, normally esters of alcohols containing 8-10 carbon atoms. The acids used include phthalic anhydride, phosphorous oxychloride, sebacic, azelaic, adipic and fatty acids. The so-called polymeric plasticizers are also usually esters but of polyhydric alcohols and dibasic acids such as propylene glycol and adipic, sebacic or azelaic acids.

A somewhat different picture emerges with the secondary plasticizers and extenders. Esters of the fatty acids form one group. The petroleum industry also provides a number of useful types including petroleum residues and alkyl or aryl hydrocarbons. Other materials which are not esters include nitrated, halogenated and chlorinated aryl or alkyl or mixed hydrocarbons.

A vast number of comparatively obscure chemicals is now being tried for specialized properties, particularly in the USA. Examples include alkyl esters of straight chain dibasic acids of the type HOOC $(CH_2)_n$ COOH where n=4 to 8 (*e.g.* esters of hydroxystearic acid); tri-esters; mono-esters; glycol esters (*e.g.* diethylene glycol dibenzoate) and so

on. No doubt the search for these and similar materials will continue.

Theory of Plasticizers

The theories to explain the behaviour of plasticizers are by now both long and varied and an article on the technology of plasticizers is not the place to discuss them. However, the present situation may be summarized briefly to allow a better understanding of technological problems and techniques.

The molecules of resin are held together by strong Van der Waals forces and it is the function of the plasticizers to insert themselves between these forces in order to weaken them, thus allowing the molecules to slip more easily past each other. Such a function could be achieved by mere solvation, but the action of a plasticizer is much more than this since to perform its function satisfactorily it must have some form of permanent association with the molecules. Thus far the theories agree but it is the nature of the bonds which hold the resin to the plasticizer which causes the real controversy.

It is quite certain that small amounts of plasticizer are held firmly by the resin but with increasing plasticizer content, the forces holding the plasticizer become weaker and weaker. There is a point in this process where a marked break in the curve of some physical property plotted against plasticizer content occurs. The feature is illustrated by the fact that the percentage of plasticizer extracted by oil or heat is very low with low plasticizer contents, *i.e.*, with the plasticizer which is held by strong forces. Similar transition points to the above occur when the temperature is raised. For example, the dielectric constant and refractive index change sharply.

Stochiometric Association

Various investigations have been carried out to determine whether there is any stochiometric association between resin and plasticizer. In some cases a relationship has been found and in others it has not and this has led to opposing theories. This is because much confusion has occurred as a result of the failure to distinguish between the various resin/plasticizer combinations. At low plasticizer content, there will be some stochiometric relationship, but above this, where the bonds become weak, there will not. Different plasticizers have very different affinities for resins and each one of them will have a different stochiometric relationship. There is much scope here for research.

One final point is of interest. This concerns 'internal plasticizers' the idea of which was conceived many years ago. If the 'plasticizer' is built into the molecule during polymerization then no further plasticizer should be needed. Vinyl acetate and vinylidene chloride confer a very slight plasticizing effect on copolymers. A very effective copolymer is vinyl chloride/vinyl stearate which bears a marked resemblance to normal TTP/pvc systems.

A modern summary of resin/plasticizer theory has been given by Kadesch.[1]

Efficiency

It is only proposed to summarize this important subject in this introductory article and full details are given in Article 2. The problem is often loosely stated as 'what is a good plasticizer' but really it is the efficiency of the plasticizer which is of interest. A detailed study of the problem has been made by Jones, Hill and Williamson.[2]

The 'efficiency' or 'effectivity' of a plasticizer means the degree to which it will perform the function of weakening Van der Waals forces and combining with the resin. The ease with which it fluxes with the resin is also an important part of the concept.

At the moment the problem is divided into two component parts, although this divided concept has tended to be the result of idea development over the years rather than deliberate policy. The original idea was to determine the efficiency of a plasticizer by its miscibility, an obvious approach and one which gave some useful practical results. However, it was soon realised that such an approach can only give limited information since, within limits of miscibility, one plasticizer with lower miscibility than another can easily be a 'better' plasticizer from other points of view.

The concept of efficiency or effectivity factor was developed as a result of these arguments. The idea is to determine the quantity of plasticizer required to give a certain value of a property such as torsional modulus and resilience. A base plasticizer is then chosen (usually DOP) and the effectivity quantity of this is divided into the effectivity quantities of the other plasticizers to give the effectivity factor. Such work as this places the plasticizers in a certain order, making dibutyl phthalate one of the most effective plasticizers and PPA polymeric types some of the least effective plasticizers. It is interesting to note that, in general, the viscosities of the plasticizers place them in a similar order.

The degree of miscibility can be measured by compounding stocks and measuring properties but to obtain really useful results many compounds would have to be made. A much more effective method is to measure the μ value concept used by Doty[3] which is a numerical index of the degree of mixing of plasticizer and polymer. Further details are given in Article 2.

Thus theoretical concepts of plasticizer efficiency are being studied and it will be shown how this can help the practicing technologist.

Plasticizer Classification

There is now a large number of plasticizers which is in danger of confusing the user. It is clearly necessary to make a classification of the materials to reduce labour in making a choice of the available types. It is only proposed to summarize the classification in the present article and to give a much fuller list in Article 2.

The plasticizers have been divided into five main groups combining methods of classification such as chemical composition, end usage, physical properties and so on. The important point is that except for the miscellaneous group, each one has many characteristics in common.

Group 1 is the largest and contains the esters of phthalic anhydride. They have good all round properties including reasonable low temperature resistance and good ease of incorporation into resins. One defect is that they do not give compounds with good flame resistance so that Group 2, the phosphates, forms the next most popular group. These also have the advantage of comparative cheapness. In the former group di-octyl phthalate (DOP) and di-iso-octyl phthalate (DIOP) are popular and in Group 2 tri-tolyl phosphate is perhaps the oldest common plasticizer.

Group 3 plasticizers are for low temperature applications and include adipates, sebacates and azelates. Examples include di-octyl sebacate (DOS) and di-butyl sebacate (DBS). Group 4 plasticizers include the polymeric types which are polyesters of adipic, azelaic and sebacic acids and glycols. A common example is polypropylene adipate. Many other groups could be created but it is simpler to classify the remainder under 'miscellaneous'. Group 5 may, therefore, include ricinoleates, oleates, epoxy plasticizers, ethers of glycols, aliphatic esters and a vast variety of other types.

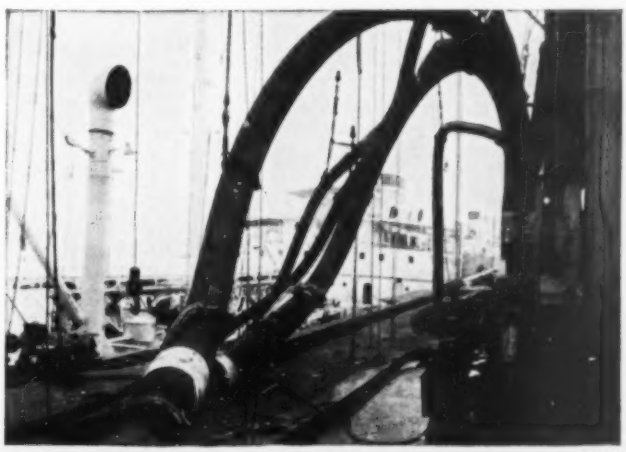
Synonyms

The general state of flux in the plasticizer industry may be indicated by the different names under which

Congratulations...

...you must be the chap who suggested we change to oil suction and discharge hose reinforced with HIGH-TENACITY RAYON. An excellent idea. Well done!

Hoses reinforced with HIGH-TENACITY RAYON have great strength, a high resistance to impact, heat and stretch, a high burst resistance and great dimensional stability.



Courtaulds Limited, 16 St. Martin's-le-Grand, London, E.C.1.

Courtaulds yarns and fibres in the fabric of industry

the same plasticizer is known. The best example is, of course, the change from tri-cresyl phosphate to tri-tolyl phosphate. This has now been accomplished successfully and no doubt younger technologists will automatically think of TTP whereas many will still undoubtedly think of TCP.

A list of synonyms is given in Table 1 which standardizes the names used in the present articles and will perhaps help industry. In particular, there is a tendency nowadays to use di-2-ethylhexyl phthalate instead of DOP (di-octyl phthalate). This is, of course, chemically accurate but it seems quite unnecessary to change the shorthand symbols which have become commonplace and it is proposed to retain them in the present article.

TABLE 1
PLASTICIZER SYNONYMS

Plasticizer	*Synonyms (not necessarily chemical)*
1. Tri-tolyl phosphate	Tri-cresyl phosphate
2. Di-octyl sebacate	Di-2-ethylhexyl sebacate
3. Tri-xylyl phosphate	Tri-xylenyl phosphate
4. Di-2-butoxy ethyl phthalate	(*a*) Di-butyl glycol phthalate
	(*b*) Di (ethylene glycol mono-n-butyl ether) phthalate
5. Di-octyl phthalate	Di-2-ethylhexyl phthalate
6. Tri-octyl phosphate	Tri-2-ethyl hexyl phosphate
7. Phthalate 79	(*a*) DA 79 P
	(*b*) Phthalate of Alphanol 79
8. Butyl iso decyl phthalate	Decyl butyl phthalate
9. Di-iso decyl phthalate	Di-decyl phthalate
10. Octyl decyl phthalate	(*a*) Iso-octyl iso-decyl phthalate
	(*b*) Iso-octyl decyl phthalate
11. Di-decyl adipate	Di-iso decyl adipate
12. Octyl decyl adipate	(*a*) n-decyl, n-octyl adipate
	(*b*) Iso-octyl, iso-decyl adipate
13. Di-nonyl phthalate	Bis-(3 : 5 : 5 trimethyl hexyl) phthalate.

Future Articles

The subject of plasticizers is now extremely complex and detailed. Although there are a number of popular types, particularly DOP and TTP, they are now being replaced for two main reasons. These are technical improvements and lower costs.

The technical improvements usually take two forms. Either an outstandingly different property (such as flame resistance) or a marginal property (such as 'drape' or perhaps low temperature resistance) is required. In the former case complete replacement might be adopted. Both techniques are discussed in full in future articles.

As already indicated the efficiency of plasticizers will be discussed in detail in Article 2. This is important because, for strictly comparable results, plasticizers should be compared at similar efficiency levels rather than at equal quantities. The situation is analogous to a comparison of accelerators at their optimum levels in the rubber industry.

A detailed classification of plasticizers will be given. This is most valuable since today there are a number of plasticizers which have very similar properties and a knowledge of the group or sub-group into which they fall will save much work. In this a brief description of every common plasticizer will be of assistance. A method of choice of plasticizer will also be given, based on these properties, so that experimental work can be reduced to a minimum. It should be stressed, however, that although much can be done from the point of view of choice by known properties, a final choice should always be made on the basis of laboratory work and field trials since interaction between polymer, plasticizer, stabilizer and filler is always possible.

As with stabilizers, it will be necessary to consider commercial products. This applies particularly to the 'polymeric' type plasticizers which are invariably sold under trade names so that a consideration of them becomes essential.

In general, it is proposed to consider all well known plasticizers and their applications and properties. Details of compounds will be given where necessary.

REFERENCES

[1] R. G. Kadesch, *Modern Plastics*, May 1959, p. 133.
[2] H. Jones, A. Hill and I. Williamson, *Trans. of the Plastics Institute*, July 1950.
[3] P. Doty and H. S. Zable, *J. Polymer Science*, **2**, 157-177, 1947.

In the second article in this series, which will appear in *RPW*, September 16, Mr Penn will describe the methods of assessing the efficiency of plasticizers and will make a classification of the materials commonly used.

Budapest Fair Closing Date

The final date of application for space at the Budapest Fair in May 1962, has been fixed for November 1 1961. Details may be obtained from the organizers, Budapest Fair, Budapest XIV, Városliget.

Rubber Bag Aids Concrete Distribution

TO achieve economy in the distribution of cement and concreting aggregates, Rodeffer Industries Inc., a California firm of ready-mixed concrete distributors, has developed a new rubber container known as the Roto-Bag.

A Roto-Bag about to be emptied into the drum of a concrete mixer

At a central site the sand, gravel or stone, cement and water necessary for a batch of concrete can be sealed inside the Roto-Bag. The cement must be kept separate from water and moisture and is contained within an inner bag.

Normal Mixing

When the purchaser wishes to concrete he has a container which holds a suitable concrete mix for his purpose delivered to the building site, where the contents are emptied into a mixer and mixed in the normal way.

By this means good quality concrete is obtained without the concrete mixer operator having to bother about the correct proportions of sand, cement and water.

Development of the containers has been carried out by the General Tyre and Rubber Co. Each container is cylindrical in shape and has a diameter of 4ft. When empty they have a weight of 200lb., which increases to just over 6,000lb. when the container is filled. The exterior container is of six-ply rubber, $\frac{1}{8}$in. thick, whilst the inner container which holds the cement is of inch thick smooth rubber.

Steel collars are incorporated in both the top and the bottom of the container. The top collar is used whilst the Roto-Bag is being moved through the batching plant, making filling a simple operation. The lower collar is used for lifting the bag so that its contents can be emptied into the mixer.

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NAUGATEX AND
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LATICES

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THAT IS BEST IN THE
RUBBER INDUSTRY

Latex Dipping

SURGICAL PRODUCTS MADE ON AUTOMATIC EQUIPMENT

THE production of dipped goods from latex seems one of the less likely fields for mechanization and automation. Hand dipping has been practised for so many years that any change must have been viewed in industry with the utmost suspicion. Nevertheless, the latex industry has seen some remarkable changes during the last few years which have resulted in considerable improvements so that even the smallest company must follow suit if it is to survive in this highly competitive field.

Apart from the composition of the latex itself, one of the most important aspects of latex processing is the dipping operation. Hand dipping gives such wide variations, even with the most experienced operators, that rejections must inevitably be high. Consistency is one of the most important features of any process so that to achieve this, mechanisation is essential. A steady dip, with controlled dwell and withdrawal, can achieve remarkable results and equipment manufacturers have had this very much in mind in their developments. The latex industry is now beginning to reap the benefit of this trend which is likely to grow rapidly.

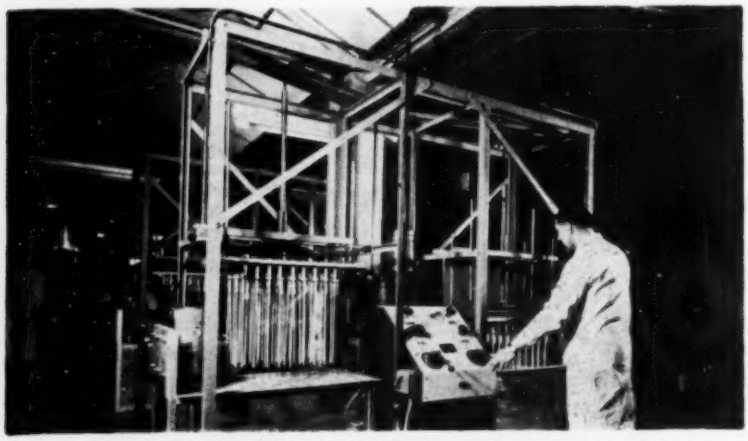
Lionel Hook Machines

Lionel Hook and Sons Ltd., of Stroud, has been specialists in the field of dipping machines for many years and now manufactures a comprehensive range of products. These are used extensively for the dipping processes of such materials as latex and pvc pastes.

The basic features of all machines are a hydraulic ram to activate the dipping frame or tank and infinite remote control over the rate of dipping. These features enable a very smooth dip to be obtained and can eliminate much personal error and production variation.

Two methods of dipping can be used. Either the tank containing the latex is raised to the articles suspended above or the articles are suspended on a frame and lowered into the tank. In the former case, the ram is directly under and coupled to the lifting table and in the latter case instead of inverting the ram it is retained in the normal position and activates the dipping frame by means of a cable. The ram assembly is always heavier than the table or frame and thus returns under its own weight.

The necessary hydraulic power is provided by a submerged helical pump which is directly coupled to a motor mounted on the oil supply tank. It is housed in the cabinet used to carry the control gear which thus forms a very compact unit. The control unit consists of two patent variable valves and a main selector valve. The former allow the speed of immersion (to as low as $\frac{1}{16}$in. per min.) and the speed of withdrawal to be controlled. The main selector valve is used for the actual operation and allows (a) rapid movement of the work to the tank, (b) immersion at the pre-set speed, (c) a dwell or stop period, (d) withdrawal at the pre-set speed and (e) fast return of the frame or tank.



Lionel Hook Dipping Equipment at Eschmann's new Lancing factory

The best proof of the value of any equipment is its suitability in the production of difficult items. One of the users of the Lionel Hook equipment is Eschmann Bros. and Walsh Ltd., who recently opened a new factory at Lancing, Sussex, for the manufacture of surgical goods. They are making extensive use of the hydraulic dipping machines with most satisfactory results.

A full range of catheters is made from natural rubber latex, no other types being used. These instruments are basically all tubular and are used for drainage purposes in the human body. The most common is for in-dwelling purposes after prostrate gland operations.

Special Design

The catheters are to Eschmann's own design based on the recommendations of doctors. It would perhaps be thought that medical authorities ought to design such articles themselves but they each have their own ideas, so that agreement is difficult. Moreover, they all like to have their invention named after themselves so that there are numerous medical instruments for the same purpose, each one bearing the name of a different doctor! Fortunately, the design of catheters has been kept within reasonable limits, one of the main variables being a balloon at the end varying in capacity from 5-30cc.

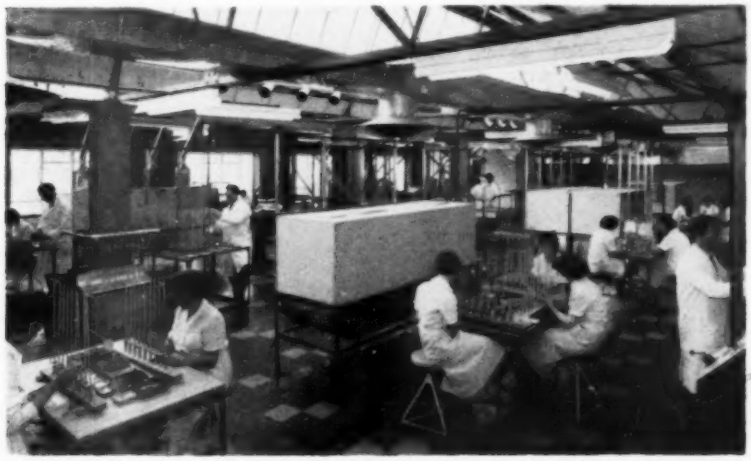
Basically the Eschmann catheter is a tube about 16in. long with a hole each end, one for placing inside the body and the other for the insertion of a syringe so that fluid can be drawn out. Superimposed on the first tube is another which connects with a small balloon which is inflated when inside the body to prevent it being withdrawn. The balloon (of 5cc. capacity) is tested at an inflation of 150cc. showing the great strength required.

Method of Manufacture

The main tube is built up on a stainless steel former. This is coated with a coagulating agent and is then dipped for the first time to give a reasonably thick coat which is allowed to dry. The side arm for the outer tube is also dipped but is not attached to the main tube at this stage. Further dips are now given.

In the next stage a thin rubber

mandrel is fixed to the side of the main tube to act as the former for the inflation tube. It is also inserted into the side arm which thus becomes attached to the main tube. Further dips are given to form the second tube and make the side arm integral with the main tube.



A general view of the dipping plant producing surgical drainage tubes

The next stage is to roll the uninflated balloon over the end of the partially made catheter and then give further dips to make it an integral part of the whole. This completes the dipping part of the sequence and the finished article appears to be one unit only, a complicated one at that, perhaps one of the most complex made in latex work.

In all, about 36 hand operations are necessary and each one has been developed to a high stage of efficiency over a number of years. Two basic problems had to be solved, however. The first was variations due to dipping and the second variations due to atmospheric changes. Eschmann tackled both of these problems in their own works and achieved remarkable results.

The Dipping Process

The company originally used hand dipping methods entirely. The quality of the product was thus very much dependent on the operator, variation was considerable and rejections were high, since inspection standards are high on such vital objects as this.

The next stage in development was to introduce mechanical (as distinct from hydraulic) means of dipping. This achieved some improvement and there was a certain amount of control but the operation tended to be erratic rather than smooth.

The various installations at Eschmann Bros. have now been converted to hydraulic operation using Lionel Hook equipment. Judgment has almost, but not quite, been taken away from the operator with immense improvements. Above all else, the dipping is now effected very smoothly indeed. In addition, the sturdiness and steadiness of the machine means that multiple dipping can be practiced, thus considerably cutting down production costs.

The operator still needs to use a certain amount of judgment because of the complexity of the catheter. For example, at the joints of the two arms, a different rate of dip to the straight tube is required. Moreover, as the former is being taken off the frame, a skilful 'flick' may be needed to prevent the last undesirable drip, although the action of the machine virtually eliminates this. The importance of the equipment, however, apart from the smoothness, is the flexibility of the controls which enables the operator to change the speed of dipping so easily without any jerking.

Atmospheric Conditions

Many manufacturers are worried by what they consider to be a variable latex. As often as not, however, their troubles are due to variation of atmospheric conditions which they refuse to believe. Eschmann Bros. discovered at an early stage that variations in temperature and humidity can affect the dipping process and they backed their opinions with practical measures. Their shop floors have been fully air conditioned at a cost almost the same as the buildings themselves! This illustrates the importance they attach to it.

Two basic methods of air conditioning have been used. These both involve filtration in the conventional manner but then they differ. The first method utilizes washing, drying, heating, humidifying and air cooling and the second (found to be the better method) heating, humidifying, water cooling and no washing.

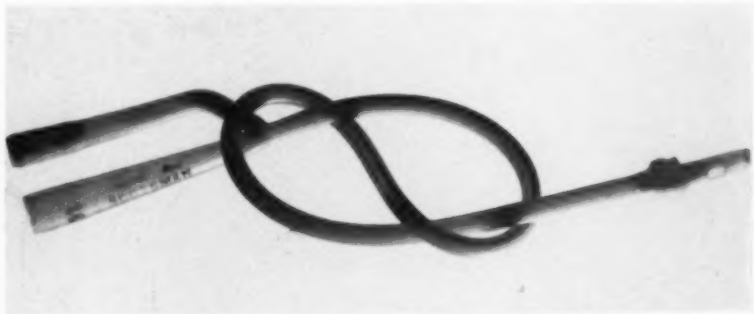
It was realized that one difficulty in controlling atmospheric conditions was to prevent heat escape when drying ovens were opened. Thus a system was devised whereby when an oven door was opened, the hot air was automatically drawn away through ducting. This assisted greatly in keeping an even temperature in the shops.

Before these precautions were taken, a considerable variation in latex viscosity was obtained during the day. In hot weather, setting-up was experienced and cold weather caused unpredictable viscosity changes. Air conditioning has overcome many problems of this kind and it is considered that much of the success of the present process is due to it.

Finishing Operations

After dipping has been finished a drying operation is necessary, as it has been at various intermediate stages. It was found that this process is vital and that the main problem is to achieve the same rate of drying at the top of the 16in. catheter as at the bottom. Special air ovens were designed for this purpose with hot air circulation from underneath.

Stripping off the formers presented no difficulties. Mechanical methods such as air stripping had been tried but were not entirely successful. The catheters are taken off under water



Latex catheter, made from natural rubber, made to Eschmann's design based on recommendations from the medical profession

which provides the only lubrication necessary.

The articles are finished off in the usual way with chlorination to avoid sticking and curing for several days. Various holes are then punched, trimming takes place and the articles are inspected and packed.

Inspection

Inspection at all stages is obviously of the greatest importance. On arrival at the factory the latex is checked for viscosity, purity, etc. This is only the start, however, and testing takes place at all stages of production.

Physical tests are carried out regularly by research associations in the UK and USA. The catheters comply with the stringent requirements of USA specifications as well as British requirements.

Apart from standard methods of examination of this kind, there are also a number of functional tests. Inflation and deflation tests are carried out on each catheter since it is important that they should deflate when inside the body, or surgery is necessary to remove them. Free and contained pressure tests are also carried out, including the 5cc. to 150cc. inflation.

There is no doubt that the Eschman catheters are made precisely and tested stringently for a vital job. At one stage the number of rejects was very high but they have now been brought down to a reasonable level, one of the most important reasons being the installation of the Lionel Hook Dipping equipment.

Sterilization

Sterilization of equipment of this kind is obviously of the utmost importance. The old method of dealing with the problem was for the hospitals to buy unsterilized articles and treat them themselves. Nowadays the tendency is for pre-sterilized articles to be brought and apparently this trend is universal.

The old methods of sterilization are also on the way out. Instead of sterilization in steam, the articles are first packaged in polythene tube and then irradiated. Radioactive cobalt is the source of gamma radiation and the process is carried out at Harwell. Tubes containing the catheters are interspersed with tubes containing the radioactive cobalt and the process is carried out under 20ft. of water.

Radioactive sterilization is also becoming popular throughout the world and Scandinavia appears to lead in the medical field. They also regard such objects as catheters as expendable items, a practice which we would do well to follow in the UK.

Lionel Hook Equipment

The Lionel Hook equipment consists of a range of seven dipping units, varying in size, use of table or frame and accessories. Some details of each type are given in Table 1.

TABLE 1
DETAILS OF LIONEL HOOK DIPPING EQUIPMENT

	Stroke, in.	*Max. dipping depth, in.*	*Max. plain tank size, in.*	*Notes*
IR	20	17	28 x 24 x 20	Lower table. Upper framework fitted with rotatable frame if required.
IIR	20	17	28 x 24 x 20	Similar IR except two stations.
IVR	18	15	39 x 30 x 18	Single machine for lifting greater loads. Table below.
VR	26	23	26 x 29 x 26	Components dipped from frame above.
VIR	26	23	26 x 29 x 26	Similar VR except two stations.
VIIR	30	27	48 x 36 x 30	A larger machine.
VIIIR	30	27	Max. size possible, 90 x 36 x 30	An exceptionally large machine.

BICC High Temperature Cable

British Insulated Callender's Cables has introduced a flexible glass-fibre insulated cable for use as a light-fitting connexion.

The new cable is specially designed to function at the high temperatures likely to be encountered in contemporary lighting fixtures used for illumination in modern office blocks, large stores and in enclosed show cases.

Ultra-Pak Tetrahedral Packages

AS reported in *RPW* August 26, 314, full scale production of Packaging Frontiers Inc., will begin soon at its new headquarters building at Waltham, Massachusetts.

Packaging Frontiers is a subsidiary of Bemis Bro. Bag Co., and was formed in January 1961 specifically to develop the Ultra-Pak packaging system of which Bemis has acquired world-wide patent rights.

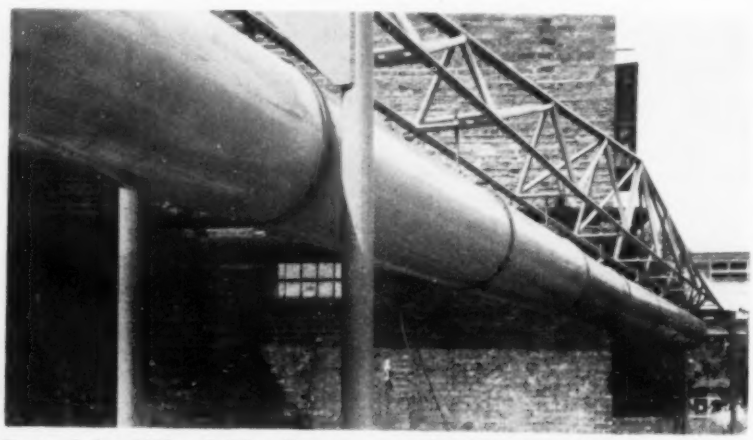
The Ultra-Pak is a tetrahedron-shaped package, and is produced on a machine which forms the pack, fills and seals it in one continuous operation.

Double rolls of material (which can be any heat sealable film, foil or lamination) are fed into the machine where they are tubed, sealed at the bottom, intermittently filled and then sealed at the top. The top seal is at 90° to the bottom seal, producing the tetrahedral package. Speeds of 250 packets per minute can be attained by the machine, which has dual filling heads, and capacities range from $\frac{1}{8}$oz. to one quart.

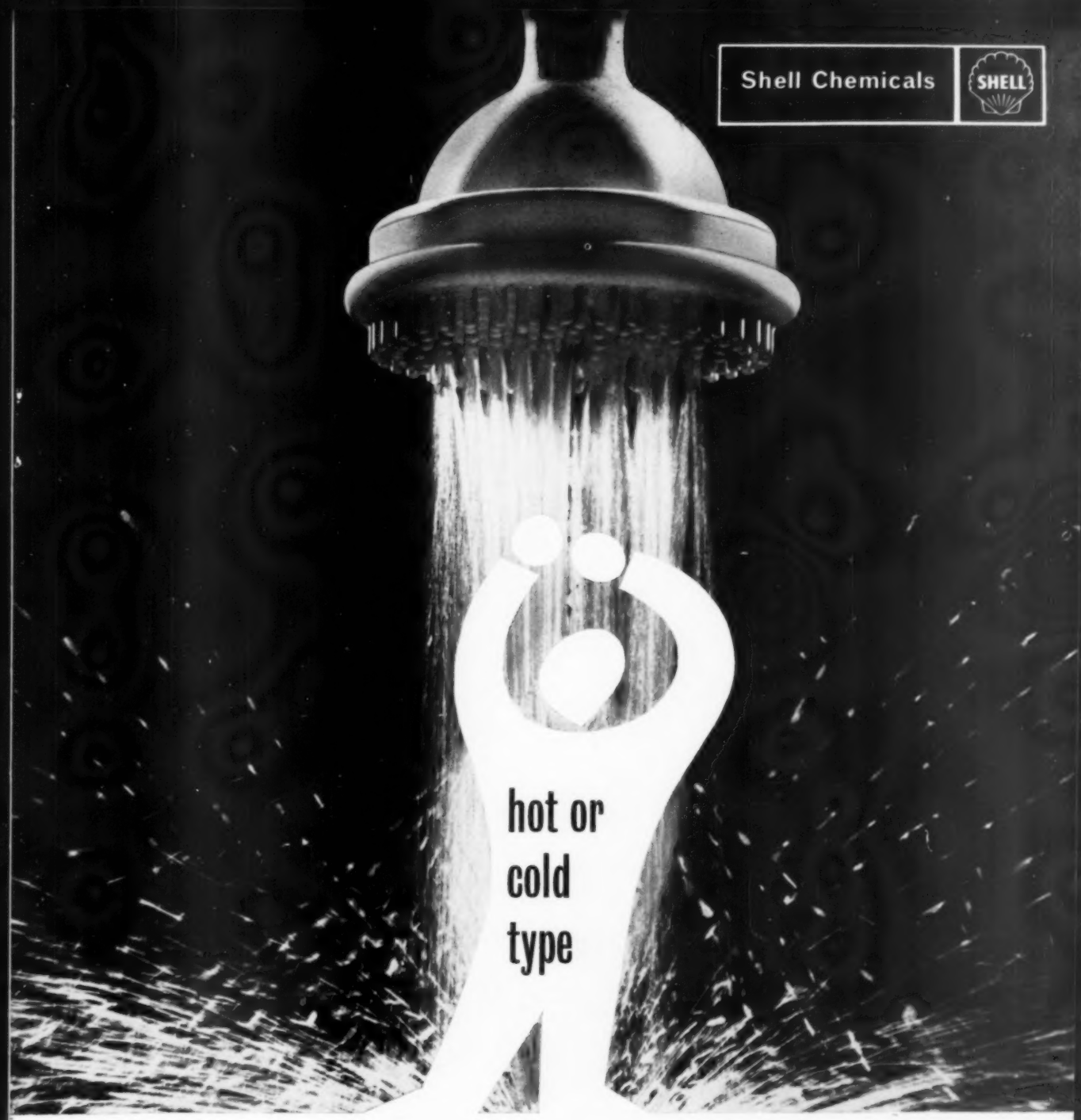
These packages are already in use for milk, jams, jellies, soaps and cosmetics, and it is claimed that the system can produce the lowest cost hermetically sealed container ever developed. A $\frac{1}{2}$oz. Ultra-Pak of shampoo won the President's award of the American National Flexible Packaging Association for the best package at the 1960 show.

Semiconductors

An international conference on The Physics of Semiconductors will be held at the University of Exeter from July 16-20 1962.



Part of the 800ft. of 15in.-diameter extruded Geon high-impact pvc pipe recently installed at the High Wycombe factory of T. B. Ford Ltd., manufacturers of blotting paper and filtration media. The pipe was fabricated by Extrudex Ltd. and replaces a series of wooden troughs



'Cariflex' is never lukewarm when it comes to supplying suitable hot or cold synthetic rubbers to stand the wear and tear of household usage. Where whiter whites and brighter brights are needed, there you will find 'Cariflex' SBR types* and the new 'Cariflex' Isoprene Rubbers, decoratively employed as tap swirls, shower-bath and washing machine fittings, flooring and many other uses. 'Cariflex' resists discolouration and ageing, is durable, easily moulded and a wide colour range can readily be achieved. For household articles, as for many other applications, 'Cariflex' is the right rubber for the job.

*S 1502, S 1509, S 1707, S 1006, S 1009.

For further information consult your Shell Company (in the U.K., apply to Shell Chemical Company Limited, Plastics & Rubbers Division, 170 Piccadilly, London, W.1.)

Cariflex
TRADE MARK

SHELL-MADE RUBBER

VIEWS and REVIEWS

Getting to Know Your Plastics

GETTING to know anything is a matter of discovering its characteristics, that is of noting the answers given to various questions. Testing, in the technical sense, is just a form of asking questions.

Often, the kind of answer you get depends on how you ask the question. Therefore, in scientific testing it is essential to specify the exact conditions of testing so that there shall be no ambiguity about the significance, meaning and application of the result.

American Testing Methods

One of the first books I should get for a works' or laboratory library would be *ASTM Standards on Plastics (With Related Information)*. Believe it or not, I also read it for pleasure.

This well-known valuable collection of over 200 separate specifications, definitions, recommended practices, and methods of testing has just been re-issued, in its 12th edition, so now is an appropriate time to have a look at it.

It runs to over 1,200 pages, yet costs even non-members of the American Society for Testing Materials only $10. It has specifications for basic raw materials especially those intended for moulding or extruding, for standard and moulded shapes like sheets, rods, tubes, pipes, laminates, and foams, for the mechanical, thermal, optical and ageing properties of plastics, for analytical methods, for electrical insulating materials, for the effects of nuclear and high-energy radiation, for some rubbers and rubber-like materials, and for a variety of miscellaneous items from goniophotometry to the verification of testing machines.

The section of the ASTM which is responsible for this vast work is Committee D-20, which is still going along actively. It works through some 22 sub-committees, consisting of representatives of producing, consuming, and general interests.

I think the sub-committees would claim that they do most of the work, certainly they or a designated sector of them prepare the specification in the first place, and almost always this involves much discussion and sometimes considerable experimenting and analysing of the results before a method is found which satisfies all requirements and all parties.

The specification, having been finally written down and approved by a letter ballot of the sub-committee, is reviewed by an Editorial Sub-Committee which seeks to improve clarity, conciseness, and grammar, and to ensure uniformity. It is then submitted to the main Committee D-20, which carries out a letter ballot of its voting membership, at least two-thirds in favour being needed for approval. The final draft is given an editorial review by the executive secretary of the society and accepted for publication either by the annual meeting or by the Administrative Committee on Standards.

One Man's Meat

If I list the items which attracted me as I read the tables of contents of this new volume, it will give an idea of the range of the book as well as of its limitations.

Among the materials: phenolic moulding compounds, vinylidene chloride moulding compounds, epoxy resins, TDI and PPG, random chopped-glass fibre mats for GRP; among the products: flexible urethane foams, flexible pvc foams; among the tests for mechanical properties: abrasion resistance, optical measurement of abrasion resistance of transparent plastics, flatness of sheet, tear resistance of film, evaluation of welding performance for pvc structures, Young's Modulus for elastomers at normal and sub-normal temperatures.

Among the thermal properties: five, bearing on the flammability of plastics; among the optical properties: colour measurement by the Munsell system, transparency measurements; among the permanence tests: accelerated service tests, outdoor weathering tests; among the definitions: abbreviation, definitions of terms, nomenclature of descriptive terms; among miscellaneous subjects: verification of testing machines, choice of sample size, guides and recommendations for writing specifications for plastics.

Bearing in mind that this is a highly selective, personal list, the range of the complete book can be guessed to be extremely wide. Most of it, of course, is more or less straightforward testing for specific properties which are basic to an understanding of plastics, but it may be of interest to comment on some of the less usual ones.

Welding Thermoplastics

There is D1789-60T, 'Tentative Method of Test for Evaluation of Welding Performance for Poly (vinyl chloride) Structures'. It begins: 'This method describes the preparation and evaluation of a standard welded joint between two pieces of rigid poly (vinyl chloride) sheet'.

The method is to prepare a weld by a standardized procedure and to test its strength on a tensile testing machine and to give it a visual examination after soaking in acetone. A piece of pvc sheet $\frac{3}{16}$in. thick is cut into two pieces, each of them 4in. by 6in., and a 6in. side of each piece is bevelled in a specified way. The sheets are clamped side by side so that there is a space of about 1/64in. between the two bevelled edges, heated with a welding gun giving a specified temperature, and then welded using three welding beads on each side.

From the weld, at least three specimens are cut and tensile tested for comparison with similar tests on the unwelded sheet. The specification is that a satisfactory weld should have a tensile strength of at least 75% of the original sheet.

Visual inspection after immersion in acetone is, I think, a particularly valuable part of the test. The specification gives in words and diagrams the characteristic appearance of bad welds and their causes, showing the effects of wrong size of filler rod, failure to weld to the middle, sheet not hot enough, and rod not hot enough.

The test is really a measure of the skill of the welder, but it also indicates in what direction improvement is needed.

Standard Humidities

It happens in a laboratory from time to time, that it is desired to obtain and maintain an atmosphere of a known relative humidity. Most chemists know that it can be

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

achieved by means of certain aqueous solutions, and some chemists will know where to go to find information about them.

In the *ASTM Standards for Plastics* there is a specification E104-51, called 'Recommended Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions'. It describes three methods for obtaining constant relative humidity (in small containers) ranging from 30 to 98% at temperatures from 0 to 70°C.

The first method is by means of a solution of glycerol, protected against fungus growth by a little copper sulphate. A table gives the relative humidity obtainable at four temperatures from 14 different concentrations of glycerol, checked by refractive index. The second method is by using a solution of sulphuric acid, and a table is given for 17 concentrations (checked by density) showing the humidity obtained at four different temperatures. A third table, extracted from *International Critical Tables*, gives the humidities obtainable at various temperatures with saturated solutions of 15 different salts. Useful precautions in the methods adopted are also discussed.

Elephant's Breath and Afterglow

At some time or other, most plastics technologists are confronted by the problem of characterizing colours, mainly in order to be able to reproduce a wanted colour as closely as possible without the confusions and mistakes arising from human judgment in a notoriously individualistic field or from the changes caused by fading. It is by no means a modern problem and not an easy one.

There are elaborate, scientific methods involving the measurement of the intensities of the wavelengths constituting the light reflected — or, what may be very different, transmitted — from the coloured object concerned. The results may be best expressed as a very wavy curve on a graph, and they are difficult and costly to determine while not always being easy to put to practical use. Such spectrophotometric systems, and especially the CIE system are available when the necessary accuracy is essential.

At the other extreme, mere names for colours are generally useless. What colour is 'red', or 'blue'? Or, worse, what is 'Elephant's Breath' or 'Jongleur'?

Munsell Colour

Between the two are several useful methods. Perhaps the best known and most widely used is that described in ASTM D1535-58T, 'Tentative Method for Specifying Colour by the Munsell System'.

The Munsell colour system is based on the conception that a colour consists of three perceived characteristics: hue, lightness, and saturation. These three may, by making one or two assumptions which have been found not seriously to invalidate the practical application of the system, be given numerical values, so that a colour can be described by finding the appropriate value for each of these parameters.

The three may be regarded as the dimensions of a 'colour cylinder', in which all possible hues are arranged continuously in the circle of the circular plane of the cylinder, from red to purple to blue to green to yellow and back to red, while the central axis is grey, ranging from pure black to pure white, and the degree of the hue, its saturation, is measured perpendicularly outwards from the central axis. By measuring each of these, a three-factor number is obtained which characterizes the colour.

Now Terylene Film

I have given a lot of space this week to the new *ASTM Standards for Plastics* because it is obviously such a valuable document, representing the distilled experience, comprehensive technical skill, and committee-shaped wisdom of the US plastics industry. But this week I have also been impressed by a trade booklet describing one of the achievements of a British plastics manufacturer, the production, properties, and applications of the polyethylene terephthalate film, Melinex, manufactured by Imperial Chemical Industries Ltd. at its factory in Dumfries, Scotland. Both the booklet and its subject matter impressed me.

'For a little over a decade the only form in which polyethylene terephthalate polymer has been fabricated in the United Kingdom is that of fibre, sold under the registered trademark, Terylene'.

'Melinex film is tough, transparent and flexible, with a high surface gloss, and has outstanding mechanical strength over a wide range of temperatures. The electrical properties of volume resistivity and dielectric strength are excellent, and because of its low water absorption the film retains these properties at high humidities. . . . Melinex film has very low gas and odour permeabilities and a low water vapour permeability, is impermeable to fats and oils, and has good chemical resistance. . . .'

It is therefore a versatile film already finding applications in a wide variety of industries, many of which are strikingly illustrated and described in this booklet. It has many uses in the electrical field and in packaging, but its decorative possibilities are such as to introduce it into even fashion industries like footwear. An interesting application is for book jackets because it has excellent tear strength, very good non-scratch and non-stretch qualities, and a high resistance to heat, water, and common chemicals.

The polymer itself can 'exist in various physical forms: it may be amorphous or it may have varying degrees of crystallinity, depending on the treatment it has received'. The manufacturing process for the film is somewhat complicated, usually being divided into three stages. First, it is extruded and quenched rapidly, which gives an amorphous but reasonably strong film which, however, is unstable to heat. So, it is 'plane oriented,' as a second stage, by heating it to above 80°C. and drawing it equally in two directions at right angles. This improves the mechanical properties and makes it no longer brittle, but it is subject to considerable contraction on heating.

The final stage, therefore, is to heat it to about 200°C. and hold it to prevent contraction. This causes considerable crystallization without appreciably affecting orientation, and confers substantial dimensional stability and transparency.

It is to be expected that there will be further applications from this film especially in those forms resulting from stopping the above process at the first or second stage, to yield films with specialized properties for particular uses.

CHARLES JENNINGS

C1

MEN *and* MATTERS

A Review of People and Events

FOR the second time in two weeks Vitafoam Ltd. has come up with an achievement worthy of special mention in this column. Only a little over three weeks ago a large proportion of their Don Mill was a smouldering ruin, the works were closed for holidays, and Norman Grimshaw, the chairman, was in the Middle East.

On August 28 — just 23 days later — the mill was back in production, and this despite gloomy forecasts by the demolition experts that it would be months before the mill was working again.

An SOS in local papers brought the labour force flocking back from holiday resorts all over the North of England, and Norman Grimshaw flew home, to direct salvage operations from a perilous perch on what had been the third floor.

Recovery would have taken very much longer were it not for the fact that Vitafoam has a permanent force of nearly 200 skilled craftsmen who build, install and maintain the plant. The only outside specialists needed on the job were the actual demolition squad. Wreckage was cleared away — and will continue to be for some weeks to come — and the gutted third floor was shored up in order to get the conveyor system below running again.

None of the firm's 1,200 employees has lost an hour's work and production is already almost back to normal.

'We can again deliver the goods', said Mr Grimshaw this week. 'Our main problem now is lack of storage space'.

The story shows the remarkable resilience and flexibility of a firm which appropriately enough makes a resilient and flexible product!

A. M. V. Simmons Retires

The man probably best known to the tyre trade for his work in

by Peter Richards

developing a repair system for tubeless tyres has retired. He is A. M. V. Simmons, who joined the Dunlop laboratories at Fort Dunlop in 1927.

Since 1952 he has been responsible for the company's interests at the MIRA proving ground at Lindley, where his activities have included acting as a tyre consultant to vehicle manufacturers and others using the proving ground.

He has also given numerous lectures at manufacturers' service schools and at distributors all over the country and has acted as a technical adviser during the production of several Dunlop films.

North British to the Rescue

The North British Rubber Co. has always been concerned with factory safety. Efficient first-aid services have been maintained and as a means of still greater efficiency the works doctor at the Castle Mills, Edinburgh, factory, recently initiated a new series of first-aid courses.

A striking example of the success of these courses is that two foremen by their newly-acquired knowledge of first-aid helped to save the life of a six-year-old boy who fell into the canal which borders Castle Mills to the south, after climbing over a boundary wall on the other side of the canal.

Two North British foremen heard the youngster's cries. They got him out and applied artificial respiration. By this time the factory first aid had been alerted and an ambulance called. A factory nurse then gave artificial respiration using the mouth-to-mouth method. The boy responded sufficiently well to be breathing normally by the time the hospital authorities took over. There is little doubt that but for the first-aid training recently undertaken by the two men concerned the boy would have lost his life.

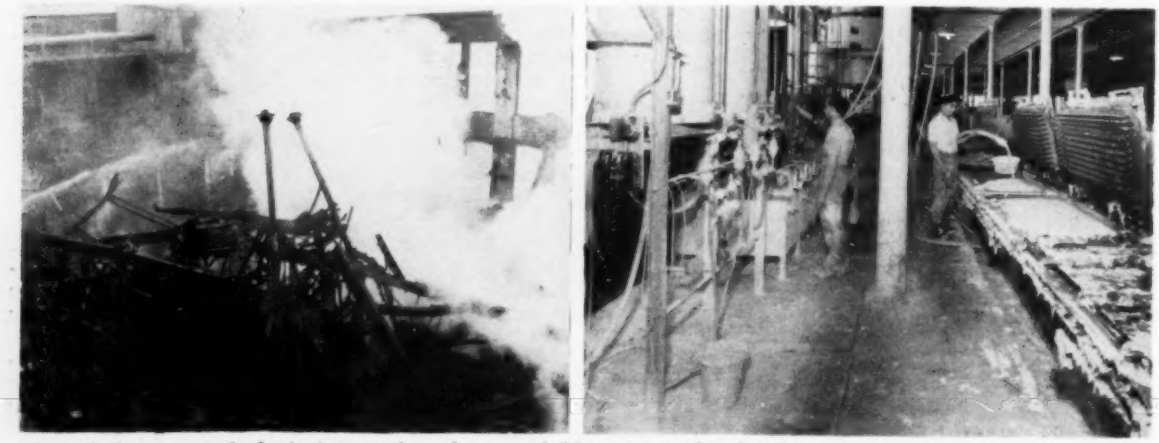
Lastex Lactron Changes

Lastex Yarn and Lactron Thread Ltd. of Leicester, manufacturers of Lactron, Lastex, Revere and Vyrene elastic yarns and threads, has made a number of changes in its marketing organization.

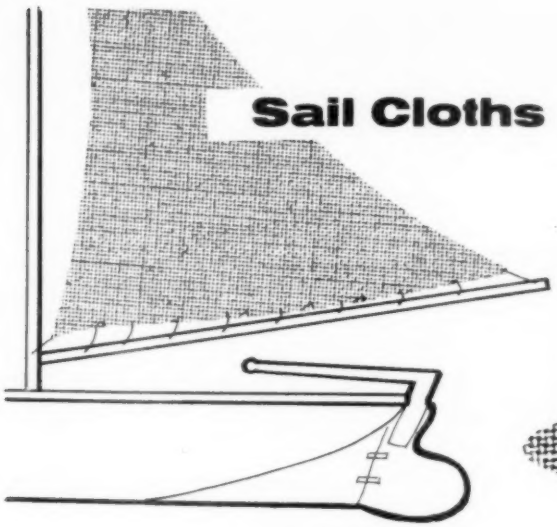
D. H. Boulter becomes sales manager for all products. He will be assisted by N. V. Saxton and R. P. Symons.

P. M. Rossiter moves to Leicester from the Birmingham factory as

August 6 . . . *. . . And Three Weeks Later*

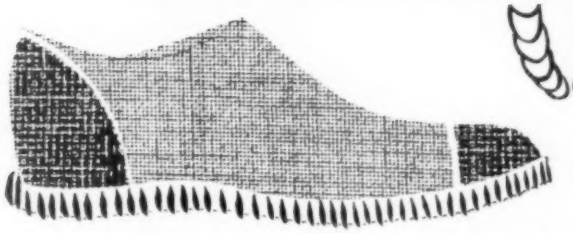


These 'before . . . and after' pictures show the remarkable recovery that has been made by Vitafoam Ltd. from the fire which destroyed a large part of the Don mill on August 5 (*RPW*, **August 12, 240**). **The picture on the left was taken on August 6, while that on the right shows the conveyor system in the mill back in operation on August 28** (*See: first item*)



Sail Cloths

Protective Clothing



Boot & Shoe Materials

Tyre Foundations **Tarpaulin Canvas & Sail Cloths** **Liner & Wrapper Cloths**
Filter Cloths **Transmission & Conveyor Belting Ducks** **Hose Fabrics**
Boot & Shoe Materials **Protective Clothing**
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sales executive. He will have special responsibilities for marketing.

W. J. Coates

It is with regret that we announce the death of W. J. Coates, works director of James Ferguson and Sons Ltd.

How Long?

How long will a pair or wellingtons last? Dunlop tells me that they have had a letter from a Mrs Patricia Lee, of York, saying that she has had a pair of their wellingtons for over a quarter-of-a-century — and they are still going strong.

Mrs Lee bought them in Llangollen in 1936 for 5s. 11d.

Are there any wellingtons still walking that can beat this?

The Bostik People

Donald E. Cameron, chairman and managing director of BB Chemical Co. Ltd., recently announced the appointment of Dr T. P. Hughes as joint assistant managing director of the company. Dr Hughes joins the firm from Tube Investments Ltd., where he has led the new research laboratories since the end of 1955, becoming their first director of research. Before that he was for eight years at the Ministry of Supply, first as head of the chemistry department of the Royal Aircraft Establishment at Farnborough, and latterly as chief superintendent of the Rocket Propulsion Department. From 1940-1947 he was with the Shell Petroleum Company as a chief chemist at their aero engine laboratory. Dr Hughes, who is 46, was educated at Gonville and Caius College, Cambridge. After taking his degree he went on to do post-graduate research in the Department of Physical Chemistry, taking his PhD in 1938.

J. J. H. Twynam

It is with much regret that we announce the death, as the result of a motor accident, of J. J. H. Twynam, who was the Western Area Manager of Radyne Ltd.

Appointments in Brief

Maurice Biddulph, Technical Manager of Universal Metal Products Ltd., has been appointed technical director of the company.

* * *

Dr Harold H. Zeiss, formerly of Monsanto Chemical Co.'s Research and Engineering Division, has been elected president and director of Monsanto Research SA of Zurich.

* * *

Two new appointments announced by Bakelite Ltd. are those of J. M. Lassen as sales manager, Polythene Sales Department, and J. M. Platje as sales manager, Vybak Sales Department.

* * *

F. W. Berk and Co. Ltd. have appointed E. G. Jewell, of the company's London Colney Works, to be responsible for advising and assisting all those Berk customers who wish to take advantage of the company's bulk delivery service.

Polyglossary . . . by Symington

4 — 'Pale Creep'

THE LEGAL ANGLE

Suing Abroad

By a Barrister

'The poor UK export record . . . has been traced to a variety of causes'. —RPW, July 15 1961.

One of these causes is that while a British businessman knows that he can sue an English customer in the English courts, he is a little afraid of what will happen if he tries to sue a defaulting foreigner. To take the case to the customer's own country may involve him in vast expense — and he does not quite trust foreign courts, anyway. But when he can sue here is something that he just does not know.

Serving the Writ

The essence of the matter is that the English Courts will only exercise jurisdiction if they can either serve their process — that is, normally, their writs or summonses — upon the defendant or its representative, in the UK. But Order 11 of the Rules of the Supreme Court sets out a series of cases when service is normally permitted outside the jurisdiction. Here are the ones most likely to concern you:

(a) Where the whole subject matter of the action is land situate within the jurisdiction.

(b) Where any contract, obligation or liability affecting land within the jurisdiction is sought to be construed, rectified, set aside or enforced. . . .

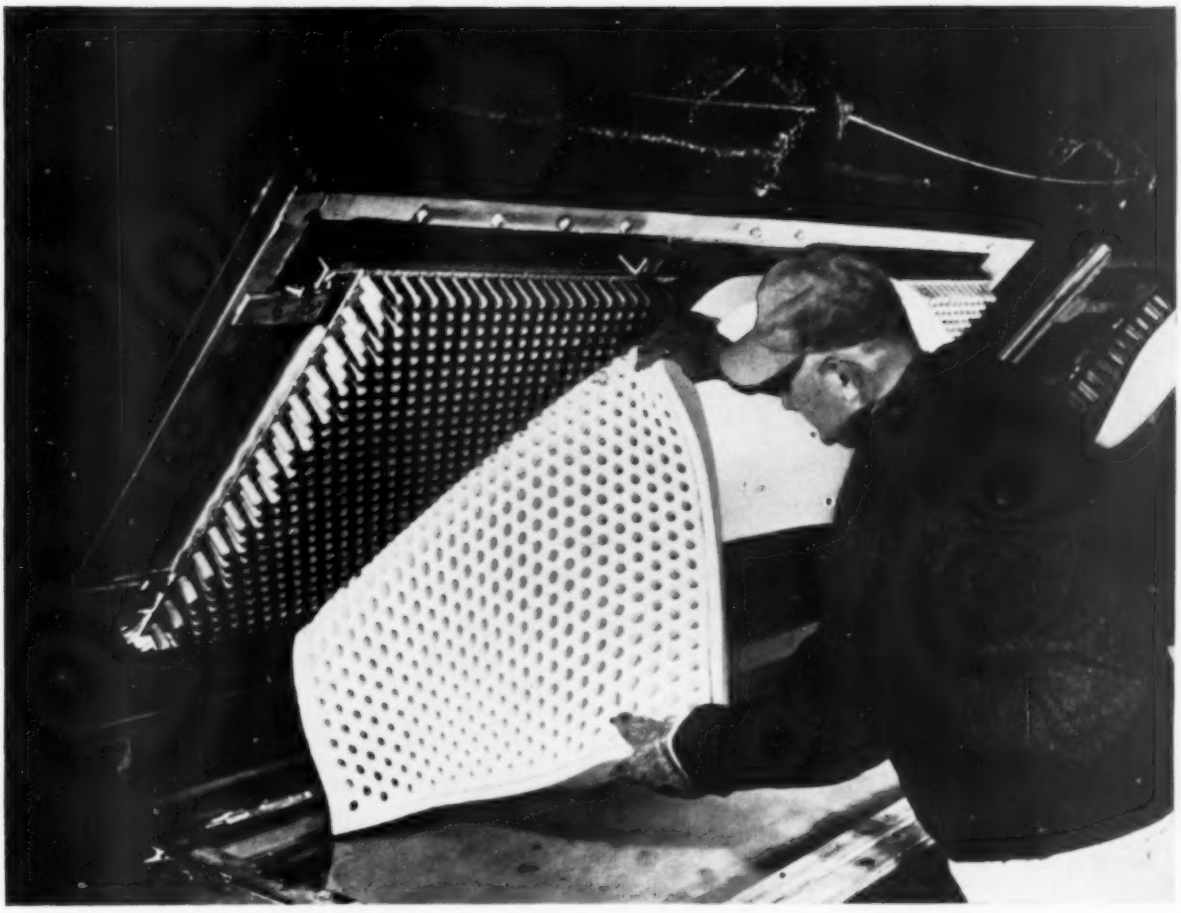
(c) Where any relief is sought against any person domiciled or ordinarily resident within the jurisdiction.

(d) Where the action is brought against a defendant not domiciled or ordinarily resident in Scotland, to enforce, rescind, dissolve, annul or otherwise affect a contract or to recover damages or other relief for or in respect of the breach of a contract (i) made within the jurisdiction, or (ii) made by or through an agent trading or residing within the jurisdiction on behalf of a principal trading or residing out of the jurisdiction; or (iii) by its terms or by implication to be governed by English law . . . or in respect of a breach committed within the jurisdiction of a contract wherever made. . . .

(e) Where an injunction is sought as to anything to be done within the jurisdiction.

(f) Where any person out of the jurisdiction is a necessary or proper party to an action properly brought against some other person duly served within the jurisdiction.

In fact, if your contracts are properly drawn up, it is almost certain that you will not have to go abroad to sue. Mind you, assuming you get your judgment from an English court, enforcing it is quite another matter. If the judgment debtor has property in the UK, all will be well. Otherwise, all is likely to depend upon Britain's treaty arrangements with the other country concerned.



New cushion against rising costs

ALL-SYNTHETIC FOAM RUBBER is here—made from a new synthetic rubber latex by Goodyear. Its name: PLIOLITE LATEX 5352. Already interested: the automotive industry, furniture companies, shoe manufacturers—even firms that have never used foam before!

WHY ALL THIS INTEREST? PLIOLITE LATEX 5352 is of such high quality that it can be used alone, does not require blending with natural latex to produce an outstanding foam. *Result: foam made from* PLIOLITE LATEX 5352 *will be substantially lower in cost than any foam rubber used before.*

ANOTHER KEY POINT: because this new Goodyear latex is man-made, its low cost and fine quality will not fluctuate.

IF YOUR PRODUCTS CAN PROFIT from a low-cost foam with excellent compression characteristics, good resilience, remarkable stress resistance and great durability—it will pay you to investigate PLIOLITE LATEX 5352. For all the facts, see your Goodyear Chemical Distributor.

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GOODYEAR

CHEMICAL DIVISION

Pliolite—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio, U. S. A.

Goodyear International Corporation, Chemical Division, Akron 16, Ohio, U.S.A.
The Goodyear Tyre & Rubber Company (Great Britain) Ltd., Chemical Division, 8-9 Bishop Street, Wolverhampton

PLASTICS MACHINERY DEVELOPMENTS

Heavy Duty Electronic Pre-heater

FOURFOLD INCREASE IN GRINDING WHEEL PRODUCTION

By JOHN SHEARING

ALTHOUGH the principle of electronic heating has now been known and used for many years, developments take place continually. These are normally of two kinds. In the first place, changes have taken place in the direction of larger machines with much greater output power and in the second place attempts are being made to speed up operations even more.

These developments are of such importance that Radyne Ltd. has given much study to the problems concerned.

Heavy Duty Pre-heater

The Radyne Heavy Duty Electronic Pre-heater is designated Type OCP.-160. This is a machine with the large output of 16kW, operating at a frequency of 60-80 Mc/s. Obviously this output is sufficient to pre-heat some of the largest mouldings likely to be encountered for normal press work.

The base of the daylight is a roller conveyor which facilitates loading of objects which are placed on a carrier plate. Provision is then made for the load to be automatically raised and the high frequency power to be switched on. At the end of the pre-heating time, which is often less than one minute, even for the largest objects, the electronic heat is cut off and the platen is automatically lowered. Thus, everything is so arranged to take up as little of the operator's time as possible and cut out personal error.

Detailed Operation

The preform to be heated is placed on the carrier tray which is run into the pre-heater on the roller conveyor. The latter is composed of a series of ceramic rollers which are thus not affected by heat transference from the heated objects. Obviously, although the heating cycle is short and in theory the heat is only put into the preform, it will not be long before the whole apparatus is heated up on a continuous production line so that rollers of this type are important.

Once the preform is inside the heater, the table is automatically raised depending on the height of the load, to a constant dimension from the fixed upper electrode. Thus height adjustment is predetermined and manually fixed beforehand.

Once the preform is in position, the high frequency power is automatically switched on and the facility of automatic tuning is provided by a motor driven variable tuning capacitator. The power output can be maintained at any preset level between 2 and 16kW.

After the necessary preheating time,

The Radyne heavy duty electronic pre-heater has an output of 16kW, sufficient to pre-heat very large mouldings

the electronic heat is automatically cut off and the lower platen is automatically lowered. Since the normal method of use of a pre-heater of this kind is to place it by the side of the press, the heated load on its carrier plate can be pushed directly into the press. If this type of set-up is envisaged, the most economic arrangement is to site the pre-heater between two presses, which means that the latter will have to have their 'piping' and control mechanism on opposite sides.

Fields of Application

Radyne Ltd. envisage a wide field of application for this heavy duty machine. It will take a variety of materials of quite considerable weight and should effect marked reductions in moulding times for both rubber and thermoplastics.

A typical use is the pre-heating of a grinding wheel blank. The Mark I machine will accommodate a size of up to 30in. diameter and 5in. thick and the Mark II unit will accommodate a blank up to 30in. diameter and 12in. thick. This is obviously a large load and a fourfold increase of production has been claimed. Apart from the heating of heavy loads of synthetic resin moulding materials, it is anticipated that larger rubber blanks will be preheated in the same way. This should result in a very great saving since once rubber components exceed a thickness of about 1in., the moulding cycle becomes unduly long since it is necessary, for best results, to employ comparatively low moulding temperatures. By the use of pre-heating of the type described, it will be possible to keep the moulding temperatures relatively high without danger of overcuring on the outside or undercuring on the inside.

Another possible field of application is in the case of synthetic resin bonded fibre or wood. In all cases of this kind it is necessary to expend a considerable amount of energy in heat transference through the non-reactive component. If the pre-heater is used, the synthetic resin component is heated rapidly so that the cure press cycle can be kept to a minimum.

Machine Details

The RF generator is constructed of heavy gauge steel, finished in hammered dimenso grey stove enamel and the oven and loading mechanism are constructed on a fabricated steel framework, zinc sprayed and black enamelled. The generator weighs 19cwt. and the oven, complete with loading mechanism, 7cwt. So far as input power is concerned, a 3-phase 50 cycle 360/440V. supply is required, although equipment to operate at other frequencies and other voltages can be supplied.

The generator incorporates the latest techniques in the suppression of radio frequency radiation ensuring that interference will not be caused with existing communication services. Full protective equipment is incorporated including AC and DC overload protection, thermal protection of oscillator valve and failure of air flow.

FBRAM Golf Competition

THE SUN SHINES AT WENTWORTH

THE annual golf competition of the Federation of British Rubber and Allied Manufacturers was held at the Wentworth Golf Club, Virginia Water, Surrey, on August 31. In order to accommodate the large number of entries for the competition and to allow some informal matches to be played during the afternoon, both the East and West courses were used and those who were fit and willing were able to play 36 holes during the day.

The weather could not have been better — with hardly a cloud in the sky — and in fact for some of those who chose to walk the 'Burma Road' twice it was probably too hot. For those less energetic it would have been difficult to find a more pleasant way of spending an afternoon than sitting in the sun on the terrace of this world-famous club which made a perfect setting for what was undoubtedly a most successful occasion.

The competition was played to Stableford rules and the overall winner was R. Edwards of Akron Standard (Engineers) Ltd., who, playing off a handicap of 2, scored 43 points — a very fine achievement. He took the challenge cup, first prize in the sweepstake, and another prize from the imposing collection presented by the members of the Federation. The second prize was won by A. H. Pendree of the Goodyear Tyre and Rubber Co. Ltd., and the third prize went to T. W. W. Davie of the North British Rubber Co. Ltd. The prize for the best gross score was won by H. S. S. Hillier of William Warne and Co. Ltd.

Other prize-winners were: C. A. Ayling (Dunlop), L. B. MacQueen (Cabot Carbon), I. Keith (BTR), F. W. Langley (Dunlop), J. W. Mattinson (Firestone), J. E. Cheetham (Whitehead Chemical Co.), R. Bassett (BTR), R. A. Clews (Dunlop), H. P. Goodall (Expanded Rubber), L. V. Jennings (R. W. Greeff), A. Smales (Philblack), J. H. C. Roberts (I.C.I.), J. A. Forbes (Rubberware), B. J. Newey (Greengate and Irwell), B. Haill (Dunlop), K. R. W. Dodson (Pirelli), E. G. Horne (Dunlop Sports Co.), Dr R. A. Storey (I.C.I.), D. O. MacDougall (Shell), H. Cowsill (Dunlop), C. D. L. Smith (Wilfrid Smith), C. F. W. Green (Ronald Trist) and E. Cramp (Goodyear).

The prizes were presented in the evening by C. H. M. Baker (Firestone Tyre and Rubber Co. Ltd.),

Continued on page 410

Among those taking part in the annual golf competition of the Federation of British Rubber and Allied Manufacturers were: 1. H. J. Knight (Shell-Mex) and C. H. M. Baker (Firestone), President of the Federation. 2. C. D. L. Smith (Wilfrid Smith) sinks his final putt. 3. J. F. E. Ruffell (Durham Raw Materials) and L. B. MacQueen (Cabot Carbon). 4. S. F. Smith and F. I. Tuckwell (Dunlop). 5. J. A. Forbes (Rubberware) and R. McEwan (ISR). 6. H. P. Goodall (Expanded Rubber) with H. Mitchell-Dawson (Rubberware). 7. A. Smales (Philblack) uses L. V. Jennings (Greeff) to check his score. 8. H. J. Hornsby (ISR) and A. F. W. Sanders (Rubber Regenerating) compare cards. 9. D. E. Cameron (BB Chemical), Vice-President of the Federation watching A. R. Bullock (BB Chemical) in play. 10. F. Wilks (BTR) on the last green with D. O. MacDougall (Shell)

Plantation Newsletter

NEW GOVERNMENT AID SCHEME FOR REPLANTING

by our Malayan Correspondent

FROM KUALA LUMPUR

THE Malayan Government is disturbed by the shipping of under-quality rubber from this country, it was learned this week. It feels that the Malayan Rubber Export Registration Board, which is the watchdog of the quality of Malayan rubber shipped overseas, has not been really successful in recent years and what is required is a thorough overhauling of this organization.

To this end, the Federation and Singapore Governments have appointed a working party of officials from both territories to review the Rubber Shipping and Packing Control Ordinance with a view to making recommendations for the setting up of a strong and effective Malayan Rubber Export Registration Board.

Unfortunately there are still many producers in this country who fail to realize that these days calls for them to be more 'customer conscious' than ever before.

This week, too, has brought good news for the industry in two fields. Firstly, it has been announced that a new and even more urgent scheme of Government-aid for replanting on estates will be introduced to replace the existing scheme which is due to expire at the end of next year. Secondly, the Government ban on the use of sodium arsenite as a weed killer due to come into force from September 1, has been deferred for six months.

Regarding replanting aid for estates, a joint working party of Government officials and representatives of the Rubber Producers Council have been meeting over the past four months working out details of a new replanting scheme for estates.

Speed-up Scheme

This was announced by the Minister of Commerce and Industry, Inche Mohamed Khir Johari, who simultaneously gave an assurance that the Government was prepared to make its financial resources available to encourage estates not only to maintain the present rate of replanting but to accelerate the pace.

This statement removed any doubts there may have been about the Government's intention to continue giving substantial help to the industry after 1962. That this aid is justified is not open to question. In fact, Malaya's first industry would be in a bad shape today but for the replanting scheme introduced in 1955.

The Mudie Mission spoke then of 'the last chance' of survival for natural rubber. The chance has been taken, a good start made. But no one supposes that the battle is over; the odds possibly have even lengthened.

Six years ago, American consumption of all types of rubber was divided almost exactly 50-50 between man-made rubber and natural. The ratio stands today at just over 71% of the one and barely 29% of the other.

High Yield Clones

Replanting with high-yielding material is, of course, the chief weapon in the battle of costs. While the amount of replanting has been very encouraging, much remains to be done. More than half of the 3,500,000 acres under rubber still consists of old unselected trees; two-thirds of the smallholdings are low-yielding material.

The second five-year plan looks to the replanting of some 650,000 acres during 1961-65, expectations which if borne out would bring the proportion of rubber under high-yielding material to 65% compared with 46% last year.

Provision was made in the plan for Government subsidies totalling $165m. Of this sum $120m. was estimated as the amount required to meet commitments under the present replanting scheme due for completion at the end of 1962, leaving $45m. for future replanting aid.

However, now the Minister's promise of Government's encouragement to estates to accelerate the pace of replanting suggests that a larger sum may be contemplated. At the very least the prospect is that the existing scale for estates — $400 an acre — will be kept up, a not over-generous figure remembering that replanting of old areas costs the majority of producers from $900 to $1,000 an acre.

More substantial inducements are in mind for the smallholders, including extension of grants for those who have completed their quota and higher grants (particularly for those with less than five acres) to meet rising replanting costs.

The improved yields of the modern clones — as high as 2,000lb. an acre — are the chief contribution to lower costs and prices. But latex collection, efficient and cheap weed control and the economic aspects of yield per tapper are matters that also require and are receiving closer attention.

Sodium Arsenite

Regarding the deferment of the ban on sodium arsenite, planters received with pleasure news of this and that any decision would be held in suspension and reviewed every six months.

Importers, however, will have to pay a levy on the poison until February, when the entire question of using the weed killer will be reviewed. Proceeds from the levy will be credited to the Livestock Compensation Fund to compensate owners whose cattle may die from sodium arsenite poisoning. The ban would have cost the industry an additional $8m. a year.

While planters agree sodium arsenite is very dangerous indeed, the whole industry will be happier if the Rubber Research Institute is successful in its quest for a completely suitable substitute.

Export Opportunities

Rubber Items for Switzerland

The British Consulate-General at Zurich has been informed by the firm of Gummi Hug AG, Lindenstrasse 30/40, Zurich, that it wishes to represent UK manufacturers in suede-lined rubber gloves, pvc flooring in rolls and tiles, and rubber items in sports, swimming and beach wear.

Manufacturers interested in this agency enquiry should write giving full particulars direct to the Swiss concern. It would be appreciated if, at the same time, they would notify the British Consulate-General, 56 Dufourstrasse, Zurich, that they have done so. (Ref. ESB/26207/61.)

Plastics Machinery for Israel

United States-Israel Plastics Corp., Industrial Area, Vav Street, Holon, has informed the British Embassy at Tel Aviv that it wishes to get in touch with UK firms with a view to acquiring 'know-how' as well as machinery, mainly secondhand for the extrusion of plastics. It would also like to receive offers for any new raw materials, with special characteristics, to be used in the extrusion of plastics.

Interested UK firms should write direct to the Israeli firm. It would be appreciated if, at the same time, they would notify the Commercial Secretariat, British Embassy, 192 Hayarkon Street, Tel Aviv, that they have done so. (Ref. ESB/25909/61.)

FBRAM Golf Competition

Continued from page 409

the president of the federation. The players had by this time been joined by some non-playing members of the Federation and more than 100 people sat down to dinner.

We publish on p. 409 some pictures of competitors taken on the courses. Owing to an unfortunate fault in the camera flash synchronization equipment, we are unable to print photographs taken of the presentation of the prizes and during the evening inside the club-house. To those who obligingly smiled for the camera and to the prize winners whose moment of glory might have been perpetuated in these pages, we apologize.

To recover loss of face

496 THE ILLUSTRATED EXHIBITOR.
from the stock, by M. Lefaucheux, is a fine piece of workmanship. As the opinions of sportsmen are now generally in favour of loading at the breech, as well from its greater facility as its less liability to accidents, there can be little doubt that M. Lefaucheux's improvement upon this invention will be extensively
among others, a splen
an ebony stock; a
silver mountings, of
whether for real ser
to the guns. The
and silver mounting
the most remarkabl
form. We must no
PISTOL IN THE RENAISSANCE STYLE.—M. GAUTIAN, PARIS.
REVOLVING PISTOL WITH SIX BARRELS.—M. LEFAUCHEUX, PARIS.
patronised. The REVOLVER PISTOLS, by the same maker, with four or six barrels, are formidable-looking instruments, of which none of us, perhaps, would care to try the power.
A FOWLING-PIECE, by M. Lepage Montier, with an ebony stock, beautifully wrought, and chased silver mountings, is one of the finest things in the whole collection.
There is great variety in the articles exhibited by M. Devisme. We may mention,
PISTOL CARVED IN

Leave mere face-saving to those who think that excuses are equivalent to performance: here is something more spectacular:—How to recover *more* than face. Does your firm use its solvents only once, and then lose them?
Tell them how much they are losing. We can tell you how much they can *recover*—profitably. If they can't do it at a profit we'll tell you that.
Dazzle them with figures! Be The Man Who Suggested Solvent Recovery By Sutcliffe Speakman! Face, did we say? My dear Sir! We are offering you Reputation—nay—Prestige!

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Plastics Statistics

JULY EXPORTS AND IMPORTS

PLASTICS materials exports increased by slightly more than 5,000 tons over the figure for the same period in 1960: 18,342 compared with 12,947. The value increased by £592,121 from £3,218,133 to £3,810,254. The figures for June 1961 were 16,073 tons valued at £3,340,879. This position is revealed in the official Trade and Navigation accounts, which also show that the largest quantity was exported to India (2,680 tons), followed by Hong Kong (1,582), France (867) and Japan (830).

Imports were lower: 6,634 tons (£2,455,252) compared with 6,717 tons (£2,364,180) in July 1960. USA was again the main supplier with 1,760 tons, followed by Western Germany with 1,459 tons.

During the first seven months of this year imports were 46,438 tons (£16,298,230): for the same period last year they were 55,021 tons (£17,431,806). Exports were 117,584 tons (£25,739,925) compared with 102,271 (£26,114,243) in 1960.

Details of imports of plastics materials during July 1961:

	Tons	£
Acrylics	351	106,220
Alkyd solid and liquid resins, solutions, emulsions and dispersions	209	37,607
Cellulose plastics:		
Acetate butyrate	124	129,871
Photographic (including cinematograph) film base (except acetate butyrate)	190	251,170
All other	148	120,913
Polyamides	636	416,249
Polystyrene	352	95,431
Polyvinyl chloride:		
Polymers and copolymers	969	148,462
All other	976	251,239
All other	2,679	898,090
Total	6,634	2,455,252

Exports of plastics materials during July 1961:

	Tons	£
Acrylic sheet, rod, tube, film, foil and profile shapes in primary form	581	322,892
Alkyd solid and liquid resins, solutions, emulsions and dispersions	546	105,631
Aminoplastics:		
Solid and liquid resins, including solutions	514	58,199
Moulding and extrusion compounds	758	131,376
Cellulose plastics:		
Moulding and extrusion compounds	199	64,704
Sheet, rod, tube, film (excluding regenerated cellulose), foil and profile shapes in primary form	161	104,211
Phenolics and cresylics:		
Solid and liquid resins (straight and modified)	811	130,388
Other	649	216,926
Polystyrene	1,244	225,502
Polythene (polyethylene) sheet, rod, tube, film, foil and profile shapes in primary form	127	39,591
Polyvinyl chloride:		
Polymers and copolymers	1,579	199,345
Moulding and extrusion compounds	1,918	206,341
Sheet	604	248,222
Other	88	22,442
All other	8,130	1,604,590
Waste and scrap (including celluloid and film waste and scrap)	1,327	129,894
Total	18,336	3,810,254

UK exports to countries in the European Economic Community (Common Market) and the European Free Trade Association are shown below.

Exports to Commonwealth countries during the month were 6,943 tons (3,903 in 1960) and exports to all other foreign countries were 5,597 tons (3,850 tons).

EXPORTS TO EEC

	July 1960	July 1961
Western Germany	453	473
Netherlands	612	811
Belgium	492	416
France	604	867
Italy	447	485
	2,408	3,052

EXPORTS TO EFTA

	July 1960	July 1961
Sweden	906	405
Norway	428	438
Denmark	551	682
Switzerland	370	432
Portugal	349	498
Austria	182	289
	2,786	2,744

(Any apparent discrepancies are due to rounding off of figures)

Rubber Statistics

UNITED KINGDOM — CANADA

IMPORTS of all rubber into the UK during July amounted to 23,097 tons, according to figures issued by the Board of Trade. Exports totalled 6,292 tons. Detailed figures are as follows:

IMPORTS

	July 1961	July 1960
Nigeria	1,338	1,377
Singapore	4,539	6,085
Federation of Malaya	7,906	12,798
Ceylon	230	292
British North Borneo	189	390
Canada	1,872	1,708
Other Commonwealth Countries and Irish Republic	317	163
Vietnam	812	447
Indonesia	502	465
USA	1,116	4,039
Other foreign countries	4,276	1,585
Total	23,097	29,349
Rubber latex	1,891	2,193
Other raw, including crepe	17,225	20,293
Balata	22	65
Synthetic rubber	3,111	4,588
Others	848	2,210
Total	23,097	29,349

EXPORTS

Commonwealth countries and Irish Republic	1,658	1,250
West Germany	254	308
Netherlands	219	225
France	658	440
Spain	994	635
Other foreign countries	2,509	2,281
Total	6,292	4,739
Synthetic and reclaimed rubber	2,392	2,188
Waste rubber	3,900	2,551
Total	6,292	4,739

Sales from the Board of Trade's stock of natural rubber in August totalled 55 tons, of which 35 tons were for October delivery and 20 tons for November delivery; 26,535 tons of rubber remained available for sale on September 1.

Canada

Consumption of rubber in June increased to 10,381 long tons from 9,676 in the corresponding month last year, according to the Dominion Bureau of Statistics. Decreases in each of the first three months of the year more than offset increases in May and June and consumption in the first half of this year declined to 53,643 long tons from 57,092 in the corresponding 1960 period.

Consumption of natural rubber in June declined to 2,887 long tons from 3,243 in the same month last year, while synthetic rubber increased to 5,959 long tons from 4,953, and reclaimed rubber to 1,535 long tons from 1,480. January-June consumption: natural rubber, 15,426 long tons (19,272 a year ago); synthetic rubber, 29,916 (28,824); and reclaimed rubber, 8,301 (8,996).

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Plantation Share Survey

THE chairman of BROOKLANDS SELANGOR RUBBER had a lot to say about the plantation industry's position and prospects in his annual statement to shareholders. 'The rubber plantation industry is facing a period of reduced earnings, due mainly to competition with synthetic substitutes which now compete in the world's markets with our product, both from the price angle and increasingly on a quality basis'.

He pointed out that in the past it had been possible to stimulate consumption of natural rubber by advertising and by other 'forms of propaganda' calculated to draw the attention of potential users to the merits of the plantation product. Today, however, plantation grades are only used by manufacturers as and when it is advantageous to them to employ such grades either because they are cheaper or they believe that a blend of the man-made variety and plantation will produce a better product in a fiercely competitive market.

'It is undoubtedly the case that tyre treads account for the largest single consumption of plantation rubber, and there appears to be no early expectation that the plantation industry will be able to sell substantially increased quantities of special rubbers for incorporation in roadmaking tar and and bitumen compounds'. Shareholders were informed that a few weeks ago in an important supplement published by one of our chief dailies, experts dealt with the big developments in road construction. 'There was no reference to the possible use of large quantities of rubber which might be expected in such development'. The chairman reminded us that the plantation industry has probably spent well over £1m. in attempting to interest the world in rubber for roads. He said: 'I do not refer to rubber blocks or rubber paving which now only survive as curiosities in a few places. I refer, of course, to the years of experimental work carried out by the industry and with some co-operation from the Road Research Laboratories which are financed by the British Government'.

The chairman considers that published results about the making and repairing of roads show that the intelligent use of a small proportion of rubber more than justifies the extra cost and it is 'somewhat shocking' to find that the plantation industry as a whole seems to be prepared to allow this potential use to fade away through the lack of interest in the subject. With regard to the subject of scientific research, he said that in Malaya it seems that Sir Geoffrey Clay has been unable to do more than give encouragement to his scientific staff who are mainly concerned with experimental work relating to the development of new and improved strains of the para rubber tree, with a little preliminary work bearing upon methods of cultivation, drainage, etc., which subjects have been grossly neglected for many years.

'Fashions in tree culture are even more bearable than in the case of agriculture and horticulture, and opinions of planters will vary almost as much as soil and climatic conditions which, to a large extent, complicate the subject'. The science or, as the chairman refers to it, the art of rubber production must, in the long run, be the main factor in any struggle for world markets between producers of synthetic and the natural variety of rubber. 'It seems strange, therefore, that so little good work has been done in this field'.

The chairman also had something to say about the question of taxation and reminded shareholders that it would be invidious to draw attention to the risks which are run by investors in certain tropical countries, and 'it is hardly necessary to point out that attractive as penal taxation may appear, the risk of overdoing it can bring very unpleasant consequences when the goose refuses or is unable to lay any more golden eggs'.

Looking ahead, the chairman considers that in spite of all developments in the world of synthetics, there appears to be a future for plantation rubber in a country which has stable government and no racial problems which must bedevil the growing of rubber in other and less fortunate parts of the world.

Production of rubber produced by BUKIT SEMBAWANG totalled 1,278,000lb. as against 1,134,000lb. for the year 1959/60. This increase was foreshadowed by the chairman, Mr Harold Evans, in his report to shareholders for last year. Unfortunately a reduction in the price of rubber meant that the group's net receipts from sales were reduced from £139,039 to £134,928. For the year 1961/62 the chairman anticipates that the company's production will exceed 1,300,000lb., but he does not anticipate that the cash receipts from the sale of this increased production will be greater than the amount received from sales last year. The directors are at the moment considering the possibility of transferring the whole of the balance of land not required for the production of rubber to the subsidiaries developing property. A dividend in excess of the profits earned during the year is being considered. It is thought that this is justified by the substantial liquid position now showing. 'It remains your directors' intention to distribute income fully, and to distribute capital profits as and when they are realized in cash, but it is impossible to forecast future distributions'.

BANDAR SUMATRA RUBBER COMPANY has under consideration a scheme of capital reorganization which will include bringing the issued capital more into line with what is believed to be the true value of the assets in the light of conditions in Indonesia. Detailed proposals will be submitted to members in due course. Following the alterations to the Memorandum of Association — allowing scope of investment in the United Kingdom to be enlarged — the directors advise that the company is in process of acquiring the leasehold (100 years) of a property in South Norwood, London, constructed in 1960, comprising two shops and four maisonettes, for a consideration of £15,500, to show a net income return of 10% on the purchase price. An option has also been taken to purchase the freehold within the next five years for £6,000.

In addition, the company has recently entered into the purchase of a residential property of Forest Hill, London, for a consideration of £4,900 for the purpose of redevelopment.

In the board's opinion, a satisfactory annual income will be forthcoming from the above purchases, carrying with them an element of appreciation in capital values. Application has been made to the London Stock Exchange for temporary suspension of the share quotation in view of these developments. An application for re-grant of quotation will be made as soon as possible.

New Offices for Retreaders' Association

At the first meeting of the new Council of the Retread Manufacturers' Association I. E. Gilroy and E. G. Wallace were appointed chairman and vice-chairman respectively. In accordance with the constitution of the association, the same two members will also serve as president and vice-president.

The full council consists of the following members: I. E. Gilroy (president), G. N. Tyre Co. (Vulcanizers) Ltd.; E. G. Wallace (vice-president), Watts Tyre and Rubber Co. Ltd.; E. G. Barwell, Barwell Rubber Co. Ltd.; W. G. W. Bird, Blue Peter Retreads Ltd.; W. J. Courtney, The Regent Tyre and Rubber Co. Ltd.; M. Demant, Union Tyre Co. Ltd.; J. Emanuel, Homerton Rubber Works Ltd.; L. G. England, Reflex Tyre and Rubber Co. Ltd.; J. M. Foster, Kenning Tyre Services; R. E. Fuller, Seagrave Tyre Co.; R. G. Hill, Fit Ltd.; L. W. R. Morley, Vacu-Lug Traction Tyres Ltd.; C. Pote, Victory Tyre Works; J. C. Price, Tyresoles Ltd.; G. Webster, Webster Tyre Co. Ltd.; E. N. Wilkinson, Ondura Ltd.

Gold Dust Tan

Fablon Ltd. has added a further colour — tan — to its Orion Gold Dust decorative laminate design.

Rubber Markets

LONDON

Prices had no decided trend and fluctuated in sympathy with Singapore movements. Buyers were reluctant to follow any uptrend and business was slow. Short covering and switching of positions featured the Terminal market. September and October shipments of No. 1 RSS were wanted but otherwise cif trading was small.

Latest prices are as follows:

No. 1 RSS Spot: 25¼d.-25⅜d.

Settlement House:

October 25⅜d.-25½d.

November 25⅜d.-25⅞d.

December 25⅜d.-25⅞d.

October/December 25⅜d.-25⅞d.

January/March 25⅜d.-25⅞d.

April/June 25⅜d.-25⅜d.

July/September 25⅜d.-25⅜d.

No. 1 RSS cif basis ports:

September 25⅜d.-25⅝d.

October 25⅜d.-25⅝d.

Godown:

September 85⅛ Straits cents.

LATEX

Centrifuged 60% latex per gallon in drums, seller, September, October, 14s. 7d., cif European ports. Spot, seller, 15s. 1d. Bulk, seller, d.w. 14s. 6d. Normal, seller, September, October, 15s. 4d.

NEW YORK

The New York rubber market ruled as under on September 5:

DEALERS' PRICES

	US cents per lb., ex-dock	
	Sept. 5	Previous
No. 1 RSS, Sept. ..	30¼n	30¼n
Oct. ..	30n	29⅞n
No. 2 RSS, Sept. ..	30¼n	30n
Oct. ..	29⅞n	29⅝n
No. 3 RSS, Sept. ..	30n	29⅞n
Oct. ..	29⅝n	29⅝n
No. 1 RSS, Spot ..	30⅜n	30⅜n
No. 3 amber blanket, crepe, Sept. ..	27¼n	27¼n

FUTURES—REX CONTRACT

	Sept. 5	Prev. Close
Sept. ..	30.35b–30.65a	30.00b–30.50a
Nov. ..	30.00b–30.13a	29.80b–29.95a
Jan. ..	29.85b–30.00a	29.65b–29.90a
Mar. ..	29.85b–30.00a	29.55b–29.80a
May ..	29.70b–29.95a	29.50b–29.75a
July ..	29.70b–29.95a	29.50b–29.75a
Sept. ..	29.70b–29.95a	29.50b–29.75a

Sales: Five. Tendency: Very steady.

Rubber futures were steadier on scattered covering in very thin dealings on Sept. 5. Traders said physical rubber was very quiet with fears of a General Motors strike restricting factory buying interest. At the close futures were very steady with dealings for the day light.

SINGAPORE

The Malayan July stock figures having been largely discounted, there was little change in opening values on September 4. Initially, buyers reduced bids but, as sellers were disinclined to follow, offered prices were paid. Conditions were generally very quiet and there were only minor fluctuations. Lower sheet interest was modest. Very quiet conditions prevailed during the afternoon and there was little trading. Lower sheets were in rather more demand, but dealers were restricted on scarcity of offerings. After hours, the market closed quiet. No. 1 September delivery buyers was down ¼ cent from the previous close at 86 Malayan cents per lb.

	Malayan cents per lb., fob Malayan ports to open ports	
	Sept. 4	Prev. Close
No. 1 RSS, Sept. ..	86 –86¼	86¼–86½
Oct. ..	86½–86¾	86¾–87⅛
No. 2 RSS, Sept. ..	85⅛–85½	85½–86
No. 3 RSS, Sept. ..	84¼–84½	84½–85¼
No. 4 RSS, Sept. ..	82 –82¼	82¼–83
No. 5 RSS, Sept. ..	76¼–77¼	76½–77¼
No. 1 RSS, Spot ..	85⅛–86⅛	85⅛–86⅛
No. 3 blanket thick remilled crepe, Sept.	78 –79	78¼–79½
No. 1 fine pale crepe, Sept.	96 –97	96 –97
2X thin brown crepe, Sept.	76¼–77¼	76½–77½
Tendency:	Quiet.	

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob, at 169.40d. per gallon.

AMSTERDAM

The Amsterdam rubber market ruled as under on September 4:

	Guilders per kilo	
No. 1 RMA	Sept. 4	Previous
September	2.39	2.37
October	2.39	2.37
November	2.39	2.37
December	2.39	2.37
October/December ..	2.39	2.37
January	2.39	2.37

Sales: Nil. Tendency: Quiet.

DJAKARTA

	Rupiahs per kilo	
	Sept. 4	Previous
Spot No. 1 Priok ..	36.50n	36.50b
Spot No. 2 Priok ..	35.50n	35.50b
Spot No. 3 Priok ..	34.50n	34.50b
No. 1 fine pale crepe, spot	34.00n	34.00b
Tendency:	Quiet.	

CEYLON

The price of No. 1 RSS at Colombo on September 4 was 104¼ (104¼) Ceylon cents per lb.

BANGKOK

The price of No. 1 RSS at Bangkok on September 4 was 27.75 (27.75) US cents per lb.

Calls for Tenders

Coating Machine

A melting-roll principle thermoplastics coating machine for coating textiles and paper or cardboard webs is required by the National Small Industries Corporation Ltd., Ranj Thansi Road, New Delhi I, India, to whom bids should be sent, quoting reference No. NSIC/HP/2M-974/61. A closing date is not stipulated (Ref. ESB/24007/61/DLF).

Tyres and Tubes

Various sizes and quantities of tyres and tubes are required by the Directorate General, Passenger Transport Service, Baghdad, to whom bids should be sent. Closing date: September 14 1961. (Ref. ESB/24973/61.)

Polythene Jointing Sleeves

Fifty thousand polythene grease-filled jointing sleeves, wanted for jointing a polythene insulated underground telephone cable, are required by the Secretary, State Tender Board, 291 Bosman Street, P.O. Box 371, Pretoria, to whom bids should be sent, quoting Formal Tender No. P.O. 2717. As local representation is essential, *Domicilium citandi et executandi* in the UK is not acceptable to the Republic Government and the name of an accredited agent in the Republic, duly appointed to act in all respects on behalf of the contractors, must be given. Closing date: September 18 1961. (Ref. ESB/27059/61.)

Tyres and Tubes

Twenty-seven items of tyres and tubes are required by the Directorate of Contracts and Purchases, Ministry of Defence, Baghdad, to whom bids should be sent, quoting Tender No. EME/35. Closing date: September 25 1961. (Ref. ESB/24839/61.)

Effluent and Water Treatment

The second Effluent and Water Treatment Exhibition and Convention will take place at the Seymour Hall, London, from October 31 to November 3.

CROP RETURNS

Unless otherwise indicated, the figures quoted, the the nearest thousand lb., represent crop returns for the month stated and for the number of months of the planting company's financial year to date. Corresponding figures are given in parentheses.

CHARLES BARKER AND SONS

July

Malaya General Co. Ltd.—582 (502).
Kuala Reman Rubber Estates—125.
Sungei-Timah Estate (Perak)—41 (38).
Batu Tiga (Selangor) Rubber Co.—204 (183).

INCH KENNETH KAJANG RUBBER

June

Inch Kenneth Kajang Rubber, and subsidiary, Kemasul Rubber Estates—262 (233). 6 mths.—1,408 (1,243).

July

Inch Kenneth Kajang Rubber, and subsidiary, Kemasul Rubber Estates—274 (242).

Industry INTELLIGENCE

Technical Data

Robac ZPD Extra

Robac ZPD Extra — a zinc pentamethylene dithiocarbamate/piperidine complex — is a non-staining ultra accelerator. In natural rubber, it gives very high moduli and, whilst this property is lost in SBR, it is a useful booster for thiazoles. It is specially suitable for rubber-cork mixes, erasers, and translucent SBR shoe soling.

Because of difficulties in dispersion which can arise in both natural rubber and SBR, Robac ZPD Extra, which is a white powder, is also supplied as a 50% milled dispersion in a high boiling aromatic sovent. This paste is readily dispersed in rubber and it is recommended for use where dispersion problems are likely to arise.

The results of laboratory work carried out to assess the behaviour of this product in natural rubber and SBR mixes are given in a data sheet available from the suppliers, Robinson Brothers Ltd., Ryders Green, West Bromwich.

Tioxide A-PP

Certain types of plastics resins, such as polythene, polystyrene and pvc, when containing special additives or when subjected to relatively high processing temperatures, show some discoloration when some grades of titanium dioxide pigments are used.

Tioxide A-PP has been added to the range of pigments made by British Titan Products Co. Ltd., 10 Stratton Street, London, W.1, to overcome these problems, and also has advantages in aqueous leather finishes. It is a fine particle anatase type pigment, specially modified to obtain the desired properties. It exhibits the same level of hiding power, high brightness and clean tone characteristics of other treated anatase grades.

Tioxide A-PP is described in leaflet BTP/86, available from the above address.

The Rutile and Anatase pigments available from BTP are now all designated Tioxide —. Those formerly known as Rutiox CR, HD and SM, are now Tioxide R-CR, R-HD and R-SM, while the former Anatase range retain the same identification letters prefixed by Tioxide A- *i.e.* Anatase DM becomes Tioxide A-DM.

Platy Talc in Butyl

The advantages to be obtained by the use of platy talc as a filler for butyl rubber are outlined in Technical Information Sheet 47, available from the Esso Petroleum Co. Ltd., Chemicals Division, 50 Stratton Street, London, W.1.

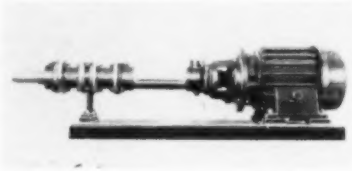
Butyl continues to find wider applications as a general purpose rubber and it has recently been found that a selected type of talc (a platy one) fills a need for a moderately priced, high physical strength filler which also is outstanding for its ability to improve the high dielectric strength of insulation compounds.

Other good electrical properties combined with low water absorption make it acceptable for most electrical insulation compounds. This plate-like structure of the talc also gives a smooth surface to extruded articles and resistance to flow in uncured compounds. This type of talc can be promoted with Elastopar to improve further uncured and cured properties.

Machines, Materials and Equipment

Ultrasonic Disperser

Ultrasonics Ltd., Westgate, Otley, Yorkshire, has recently introduced the Dispersonic, another in its range of ultrasonic homogenizing and dispersing units based on the patented principle of the liquid whistle. This has been specially designed for the high speed dispersion of powders in liquids. Rough mixes of powders in liquids or emulsions are passed in a thin stream at high velocity across a blade which is caused to vibrate at its natural frequency of 18-22kc./s. Cavitation is



induced and extremely high localized pressures applied within the liquid stream.

It is claimed that a wide variety of powders such as carbon black, colloidal clay, titanium dioxide or antibiotics can be rapidly dispersed. Difficult emulsions incorporating powders can be made with a very fine particle size. Viscous products present no problem. The throughput is very high for a machine of only 3hp, being approximately 5 gallons per minute. Highly abrasion resistant materials are used to give long life. There is no aeration of the product, nor is there any heating effect as all sonic energy is used for dispersing.

Optical Inspection Device

An optical inspection device of very small dimensions has been marketed primarily for inspecting the inside of locks and padlocks through the keyhole. Manufactured by P. W. Allen and Co., 253 Liverpool Road, N.1, there should be many industrial and laboratory applications in which it can usefully be applied.

The probe is 7/64in. diameter and 2in. long. It contains a miniature lamp and an interchangeable mirror head. By choice of the appropriate head, and rotation or tilting of the tool, complete coverage of the interior under inspection can be ensured.

Laray Viscometer

Columbian International (GB) Ltd., 116 Cannon Street, London, E.C.4, is the sole selling agent in this country for Lhomargy in France, who manufacture the new Laray Viscometer. Although this instrument has only been offered to the printing ink industry on a general basis, it has value for the manufacturer of liquids or pastes.

The Laray Viscometer has been designed for determining the viscosity of all kinds of liquid and viscous materials but particularly letterpress and offset litho printing inks. It is in principle an extrusion instrument operating by measuring the relative velocity of two essentially parallel surfaces, separated by a thin film of the material being examined, when a constant force is applied to a movable member.

Publications

TiO_2 in Paper

A booklet recently issued by British Titan Products Co. Ltd., 10 Stratton Street, London, W.1, is called 'The Estimation of TiO_2 in Paper'. This is a revised version of a paper by F. R. Williams, BSc, PhD, FRIC, which appeared originally in *Paper Maker and British Paper Trade Journal.*

As suggested by the title, the booklet describes the methods by which titanium dioxide in paper coatings may be assessed. The methods included have been selected in view of their applicability and accuracy.

Prefabricated Buildings

Ciba (ARL) Ltd., Duxford, Cambridge, has issued technical notes No. 223 on prefabricated buildings. As prefabrication is an established practice for obtaining large quantities of buildings in the shortest possible period of time, the Air Ministry adopted a programme of prefabrication to meet growing requirements for living quarters and other buildings in Aden. The booklet explains why timber was used for the building and how Aerodux 185 resorcinol resin adhesive was used for bonding all structural members because of its ability to resist water and heat, therefore being suitable for use in tropical climates. Photographs, showing the several stages from the bare wood to office blocks, are included in the booklet.

Material Prices

Prices of materials appear regularly in RUBBER AND PLASTICS WEEKLY each month. It will be appreciated if suppliers will give notification of any price changes and additions to or deletions from their range. Comments on the present materials and classifications are invited in order that the list may be made of maximum service to our readers.

Unless otherwise stated prices are per lb. In most cases prices vary according to quantity. pc—per cwt pg—per gallon pt—per ton ag—according to grade xs—ex-store xw—ex-wharf dp—duty paid sp—special prices for contracts del—delivered cp—carriage paid

Accelerators

Alpha ... 5s. 8d.—6s. 4d.
Ancap cp ... 2s. 10d.—3s. 8d.
Ancap Zinc Salt cp ... 3s. 2d.—4s. 2d.
Ancatax cp ... 3s. 9d.—4s. 6d.
Ancazate BU cp ... 6s. 3d.—6s. 9d.
Ancazate ET cp ... 5s.—6s. 4d.
Ancazate ME cp ... 6s. 2d.—7s.
Ancazate Q cp ... 6s. 1d.—6s. 4d.
Ancazate XX cp ... 5s. 1d.—5s. 9d.
Ancazide ET cp ... 5s. 9d.—6s. 6d.
Ancazide IS cp ... 7s. 6d.—8s. 6d.
Ancazide ME cp ... 4s. 6d.—5s.
Cu.D.D. ... 9s. 3d.—10s.
D.Bu.D. ... 10s. 6s.—11s. 3d.
D.D.D. ... 12s. 2d.—13s. 3d.
D.P.G. cp ... 3s. 5d.—4s. 2d.
D.O.T.G. cp ... 4s. 5½d.—4s. 9d.
Dibenzo GMF ... 27s.—28s. 6d.
Furbac cp ... 5s.—5s. 9d.
Gamma ... 10s. 6d.—11s. 3d.
GMF ... 27s.—28s. 6d.
L.M.D. ... 9s. 3d.—10s.
M.Z.I. ... 3s. 6d.—4s. 2d.
N.Bu.D. ... 10s. 6d.—11s. 3d.
Ni.P.D. ... 12s. 2d.—13s. 3d.
P.P.D. ... 12s. 2d.—13s. 3d.
P.T.D. ... 12s. 2d.—13s. 3d.
Robac 22 ... 10s.—11s. 3d.
Robac 44 ... 9s. 1d.—9s. 10d.
S.P.D. ... 9s. 3d.—10s.
Suparac M ... 9s. 7d.
T.B.U.T. ... 15s.—16s.
T.E.T. ... 6s. 6d.—7s. 4d.
Thiuram P.25 ... 15s.—16s.
T.M.S. ... 7s. 8d.—8s. 6d.
T.M.T. ... 5s. 4d.—6s. 3d.
Vulcacit CZ deldp ... 7s. 1d.
Vulcacit F deldp ... 4s. 8½d.
Vulcacit NP deldp ... 11s. 2d.
Vulcacit P Extra N deldp ... 8s. 1d.
Z.B.E.D. ... 15s.—16s.
Z.Bu.D. ... 6s. 3d.—7s. 3d.
Z.D.C. ... 5s. 1d.—5s. 7d.
Z.L. ... 9s. 3d.—10s.
Z.P.D. ... 9s. 3d.—10s.

Antioxidants and Antiozonants

Agerite AK cp ... 3s. 6½d.—4s. 5½d.
Agerite HPX cp ... 4s. 5d.—4s. 10d.
Agerite Powder cp ... 3s. 7d.—4s.
Agerite White cp ... 8s. 10d.—9s. 7d.
Antioxidant 2246 cp ... 11s. 8d.—12s. 4d.
Antioxidant 425 cp ... 18s. 6d.—19s. 3d.
Antioxidant SP cp ... 3s. 8d.—6s.
BLE-25 ... 3s. 7d.—4s. 5d.
BXA ... 3s. 6½d.—4s. 5½d.
Naugawhite ... 4s. 9d.—5s. 6d.
Octamine ... 3s. 9d.—4s. 6d.
Polygard ... 3s. 7½d.—4s. 5d.
UOP 88 xs ... 9s. 3d.
UOP 288 xs ... 9s. 3d.
Wing-Stay S ... 3s. 8d.—4s.
Wing-Stay T ... 4s. 10d.—5s. 6d.
Wing-Stay 100 ... 10s. 6d.—11s. 6d.

Compounding Ingredients

Barytes ptag ... £10—£40
Calcium Silicate del ... 9d.—10½d.
Calcene ptxw ... £52—£69 10s.
Calcined Clay (Burgess) ptxs ... £37—£53
Carbonate, Light Mg. ptsp ... £97
Carbonate, Actidated Ca. pt ... £28—£30

Carbon Blacks:
Conductex SCF ... 1s. 2½d.
Continental AMPC ag ... 11½d.—1s. 4½d.
Continex FEF ag ... 9½d.—10½d.
Continex HAF ag ... 10½d.—11d.
Continex HMF ag ... 9½d.—9½d.
Continex ISAF ag ... 1s. 0½d.—1s. 0½d.
Continex SRF, SRF-NS ag ... 8½d.—9d.
Dixie 45 GPF xs ... 6½d.—7½d.
Dixie 60 HAF xs ... 7½d.—8½d.
Dixie 70 ISAF xs ... 9½d.—10½d.
Dixiedensed HM MPC xs ... 11½d.
Dixiedensed 77 EPC xs ... 11½d.
Furnex SRF ... 9d.
Kosmos 45 GPF ... 6½d.—7½d.
Kosmos 60 HAF ... 7½d.—8½d.
Kosmos 70 ISAF ... 9½d.—10½d.
Magecol 888 cp ... 7.60d.
Micronex MPC ... 11½d.
Micronex W6 EPC ... 11½d.
Philblack A. FEF ... 7d.—8d.
Philblack E. SAF ... 1s. 0½d.—1s. 1d.
Philblack G. GPF ... 6½d.—7½d.
Philblack I. ISAF ... 9½d.—10½d.
Philblack O HAF ... 7½d.—8½d.
Regal 300 ... 7½d.—8d.
Regal 600 ... 9½d.—10d.
Statex B. FF ... 10½d.
Statex R. HAF ... 11d.
Statex 93 HMF ... 9½d.
Sterling SO FEF ... 7d.—7½d.
Sterling V. GPF ... 6½d.—7d.
Ukarb 327 GPF xs ... 6½d.—7½d.
Ukarb 340 xs ... 7½d.—8½d.
Vulcan 6 ISAF ... 9½d.—10d.
Vulcan C CF ... 11d.—11½d.
Vulcan 3 HAF ... 7½d.—8d.
Vulcan XXX SCF ... 1s. 2½d.—1s. 2½d.
China Clay ptagxs ... £12—£68 10s.
Factice Dark cp ... 1s. 0½d.—1s. 10d.
Factice Whitbro cp ... 1s. 3½d.—2s. 2½d.
Factice White ... 1s. 5½d.—1s. 11d.
Kieselguhr Spanish White ptxs £37 12s. 6d.
Lithopone 30% ptxs ... £68 10s.
Manosil VN3 pt ... £109—£139
Manosil AS7 ... £84 10s.—£114 10s.
Micafine Powdered Mica ptxs ... £67 10s.
Ochre Yellow pcxs ... £1 19s.
Oxide Light Mg ptsp ... £245
Oxide Red pcxs ... £4 3s.
Oxide Titanium 98% pcxs ... £8 8s
Rutiox CR pcxs ... £9 3s
Rubber Gen. Gran. Mineral ptxs £35 5s.
Shellac Dewaxed xs ... 2s.—3s. 9d.
Shellac Orange xs ... 1s. 9d.—2s. 3d.
Silica Hydrated ptxs ... £113
Sulphur Manox Insoluble del ... 1s. 9d.
Sulphur Powdered ptdel ... £20 17s.
Sulphur Sublimed Flowers ptxs £52 10s.
Talc Norwegian ptxs ... £13 7s. 6d.
Talc Italian ptxs ... £30 2s. 6d.
Tufknit Durham CS ... 8½d.—10½d.
White Lead Dry ptdelsp ... £114 15s.
Whitetex 2 Clay ptxs ... £45 10s.
Whiting ptxs ... £5 9s. 6d.—£7 7s. 6d.
Zinc Oxide pcdel ... £6

Plasticizers and Softeners

Abalyn pc ... 220s.—271s.
Al Stearate ptxwdp ... £253 10s.
Bisoflex 102 pt ... £513—£568
Butyl Ricinoleate ... 2s. 6d.—2s. 6½d.
But. Ac Ricinoleate ... 3s. 0½d.—3s. 1½d.
Butyl Stearate pt ... £277—£282
Ca. Stearate ptcp ... £220
Diallyl Phthalate ... 3s. 11d.—4s. 11½d.
Dialkyl Phthalate pt ... £221—£222
Dibutyl Phthalate pt ... £203—£204
Dibutyl Sebacate ... 5s. 9½d.
DiOA pt ... £354—£357
DiOS sp ... 5s. 0½d.—5s. 2d.
DOA pt ... £414—£420
DOP pt ... £276—£277
DOS sp ... 5s. 7½d.—5s. 9d.
Diisobutyl Phthalate pt ... £196—£197
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DR. W. F. WATSON

Director of Research,

Rubber and Plastics Research Association of Great Britain.

1961

Oct. 4 Historical and Economic Aspects of Factice: Mr. R. F. Reynolds (Hubron Rubber Chemicals Ltd.).

Oct. 11 Chemistry and Microscopy of Factice: Mr. A. H. Clark (FRADA Research Laboratory).

Oct. 18 The Manufacture and Testing of Factice: Mr. J. H. Carrington (Anchor Chemical Co. Ltd.).

Oct. 25 Factory Uses of Factice in Natural Rubber Compounds: Mr. J. Donnelly (British Recovered Rubber and Chemical Co. Ltd.).

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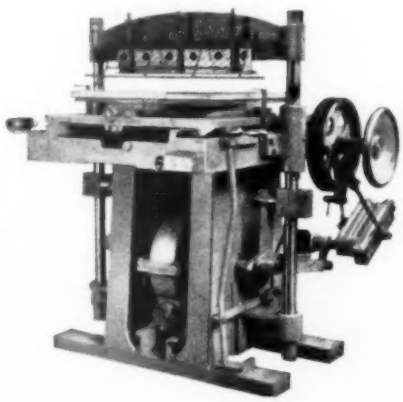

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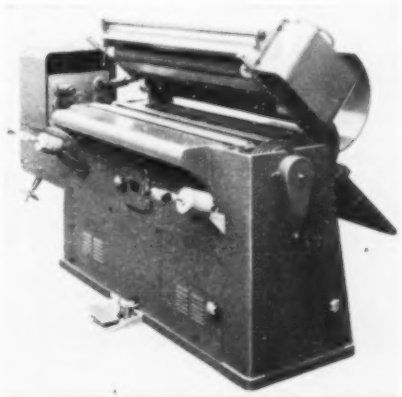

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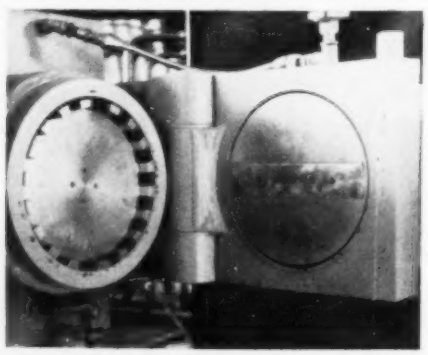

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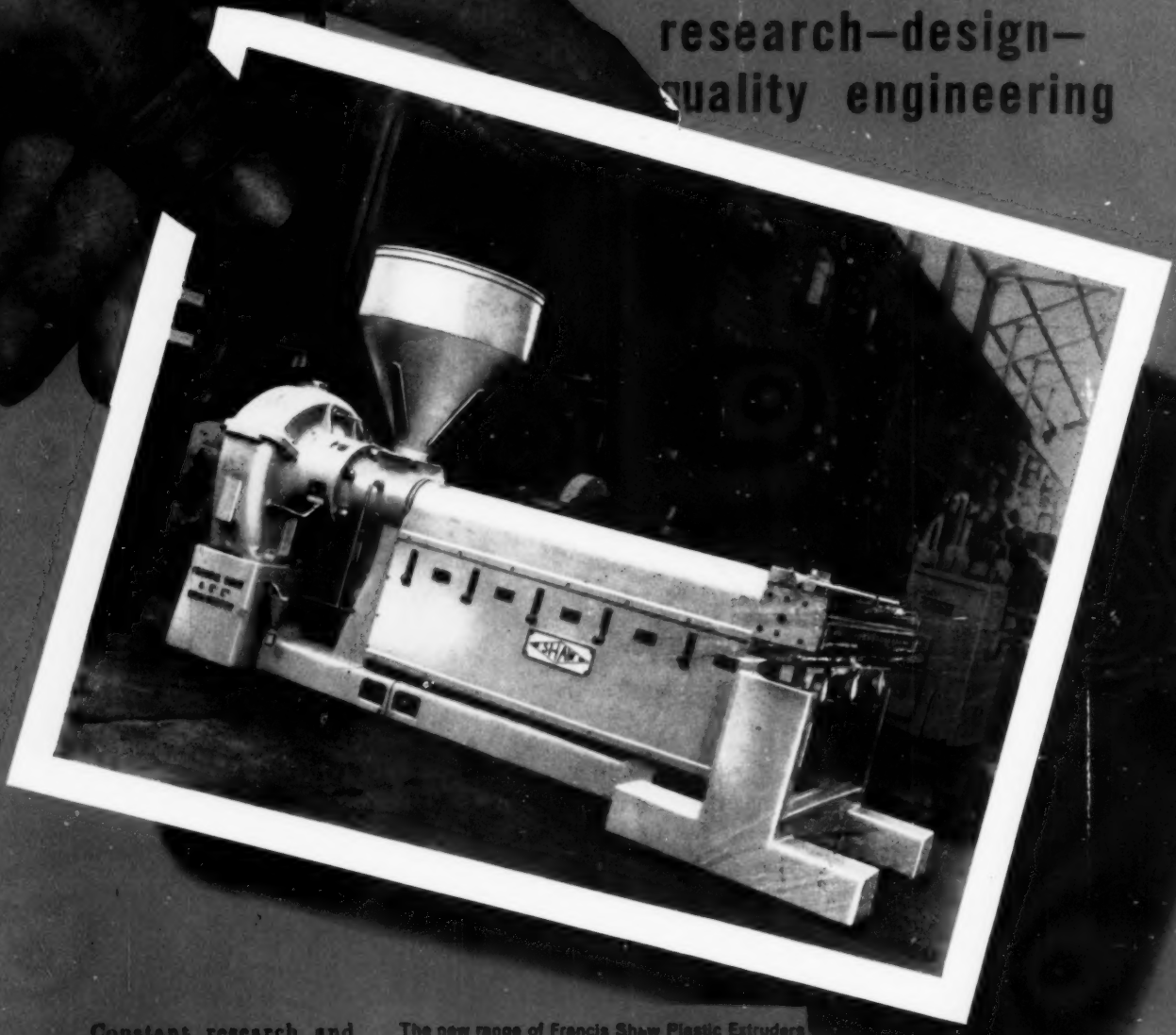

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